Gas Journal

Vol. 271. 104th Year. LONDON, SEPTEMBER 3, 1952. No. 4657. Price 1/3

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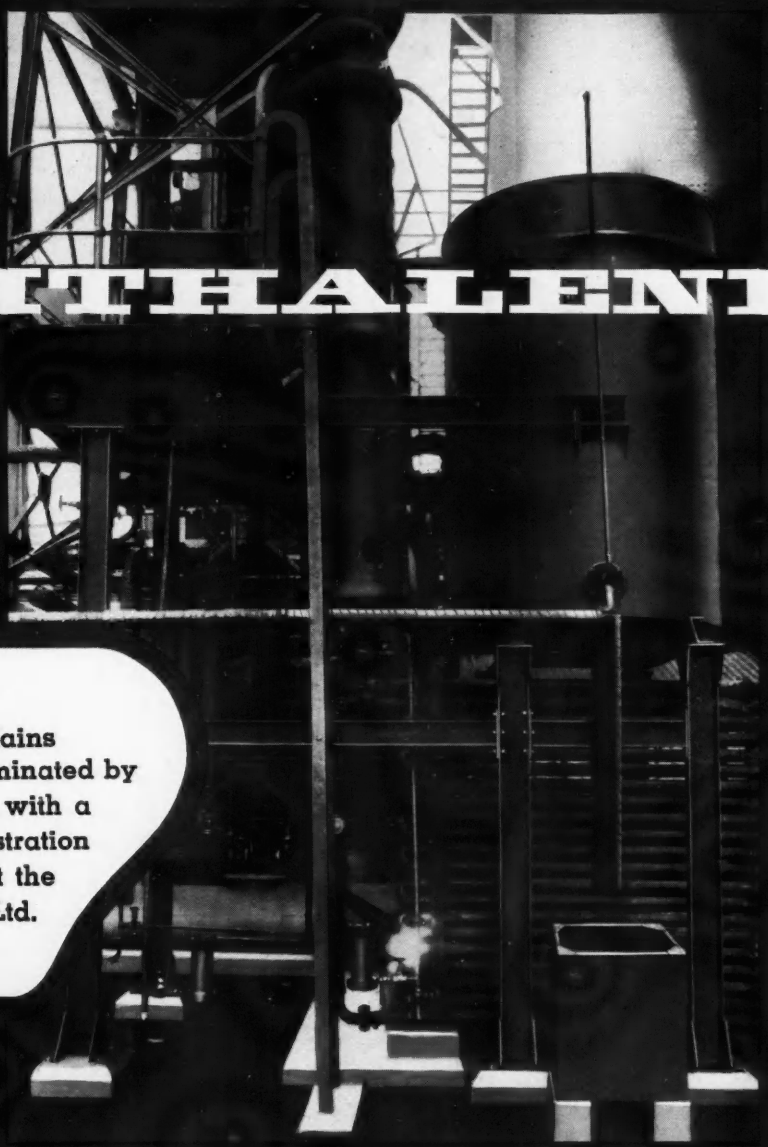

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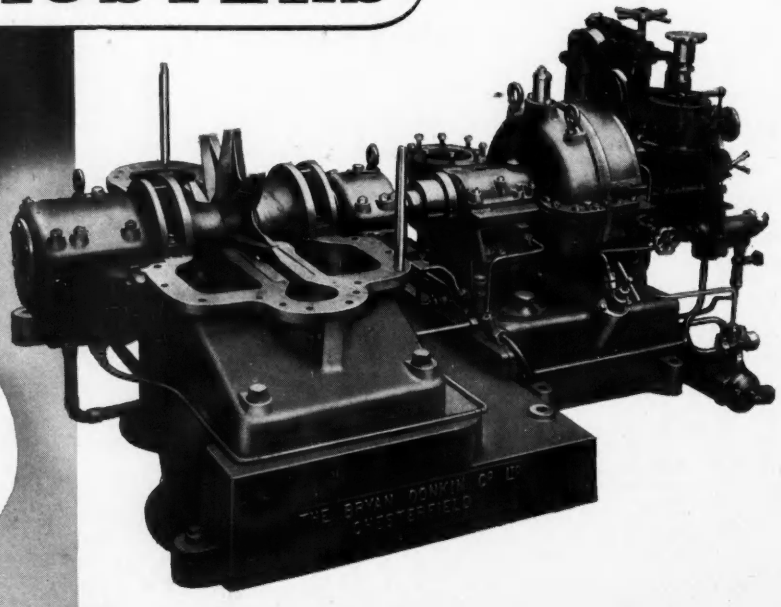

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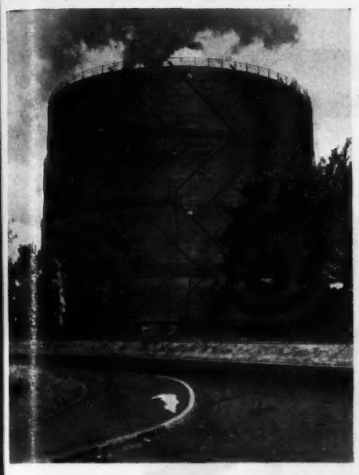

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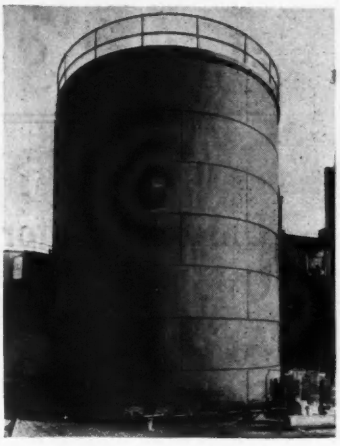

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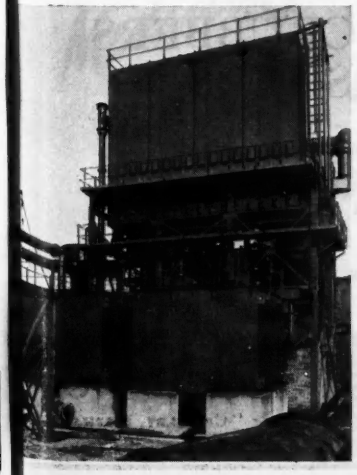

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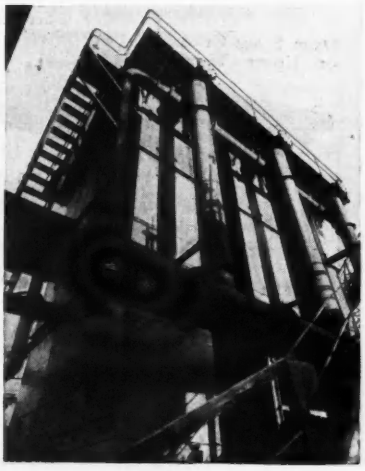

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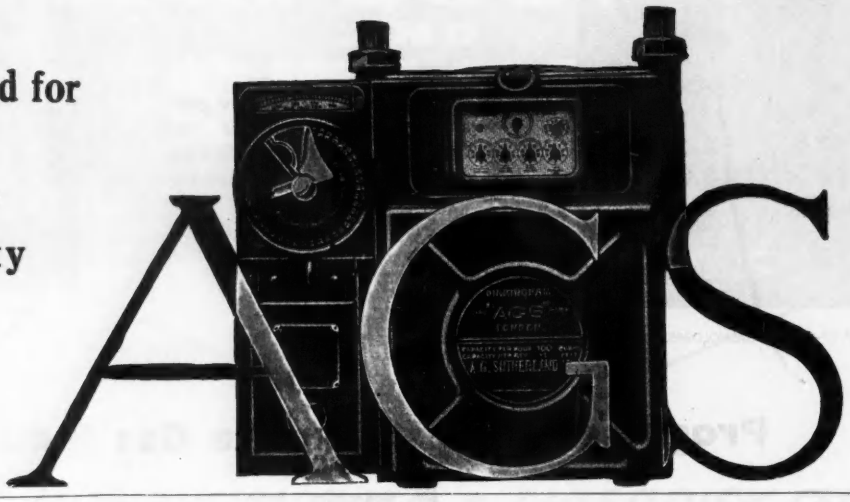

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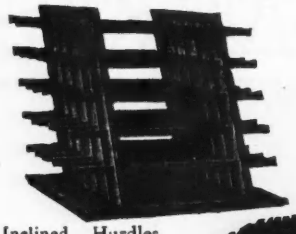

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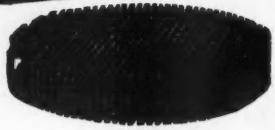

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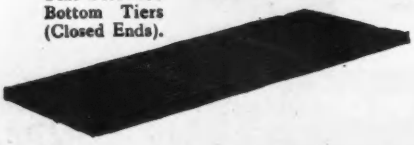

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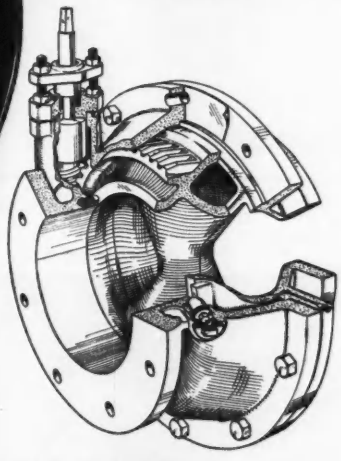

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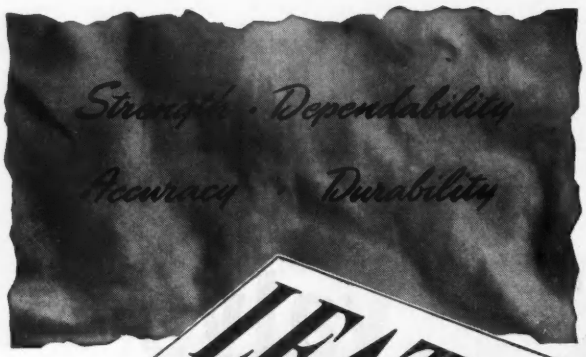

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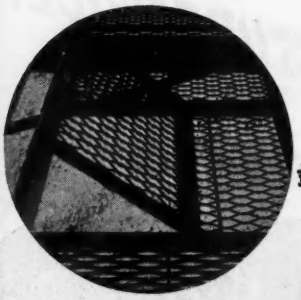

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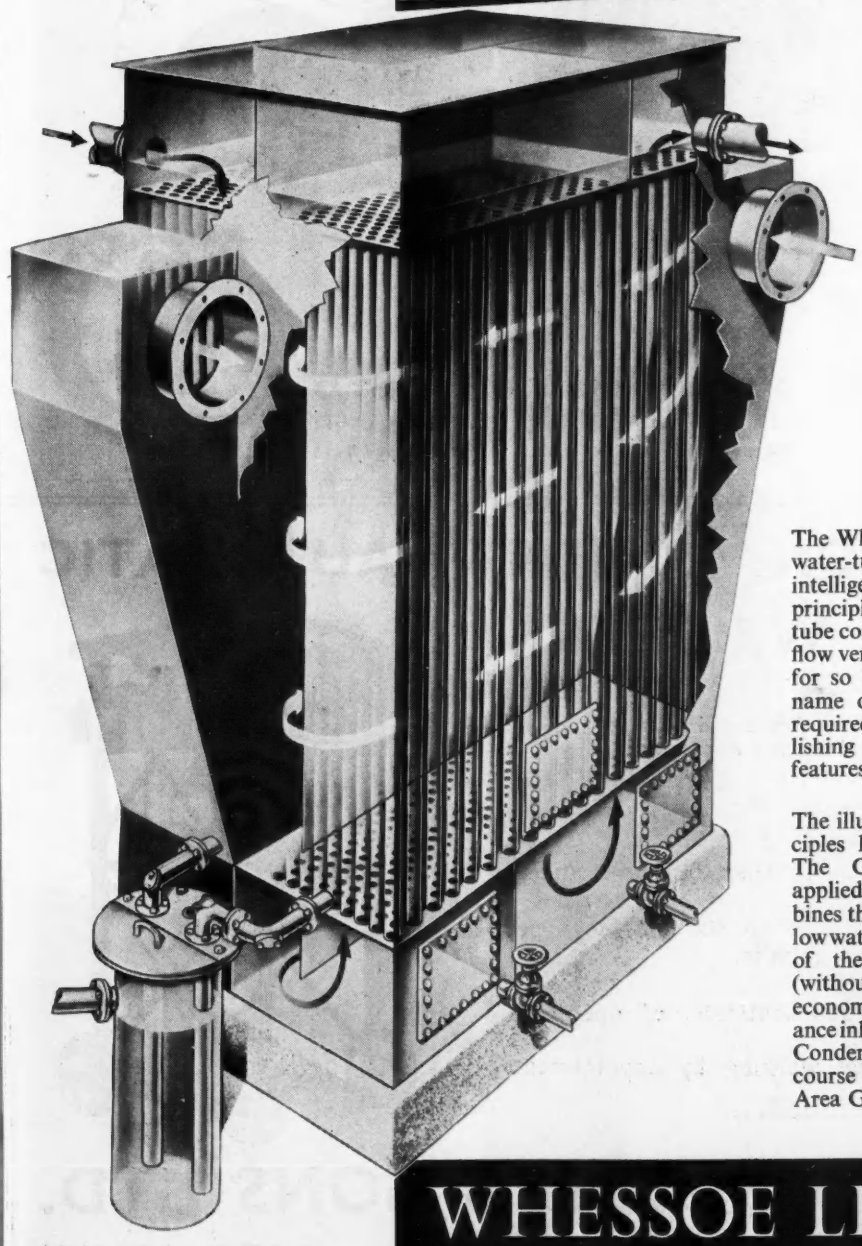

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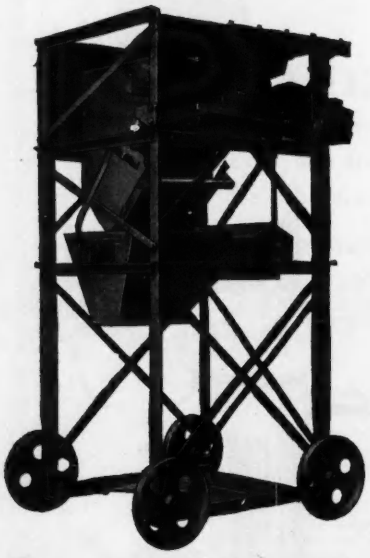

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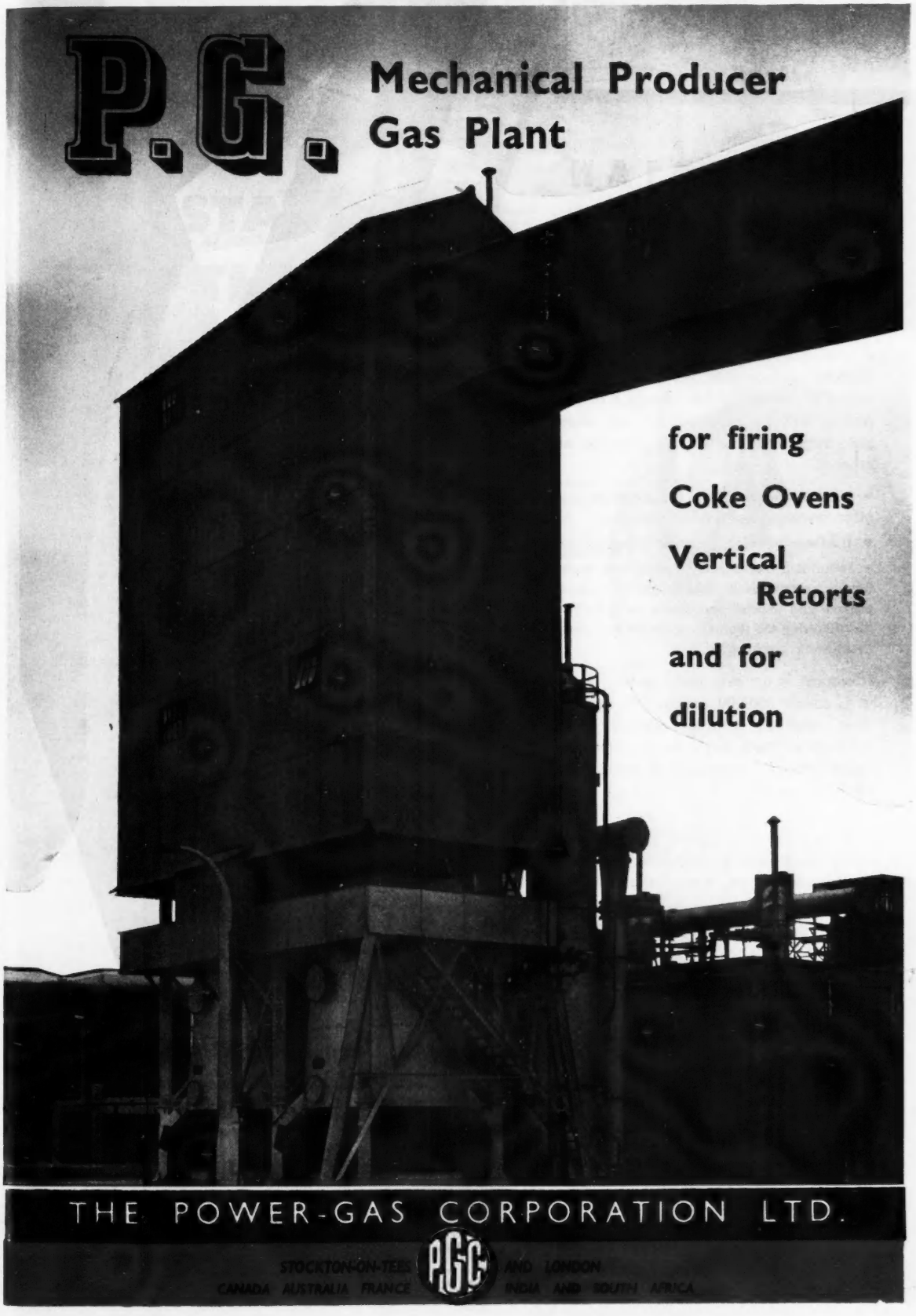
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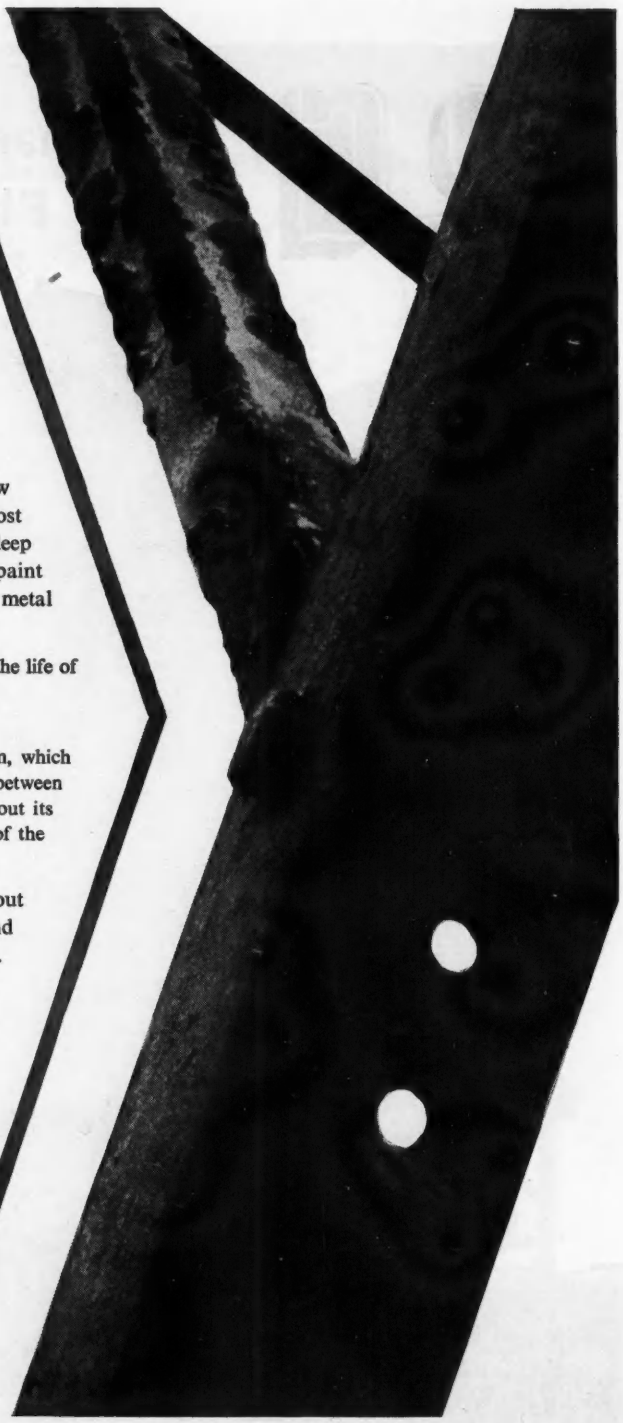

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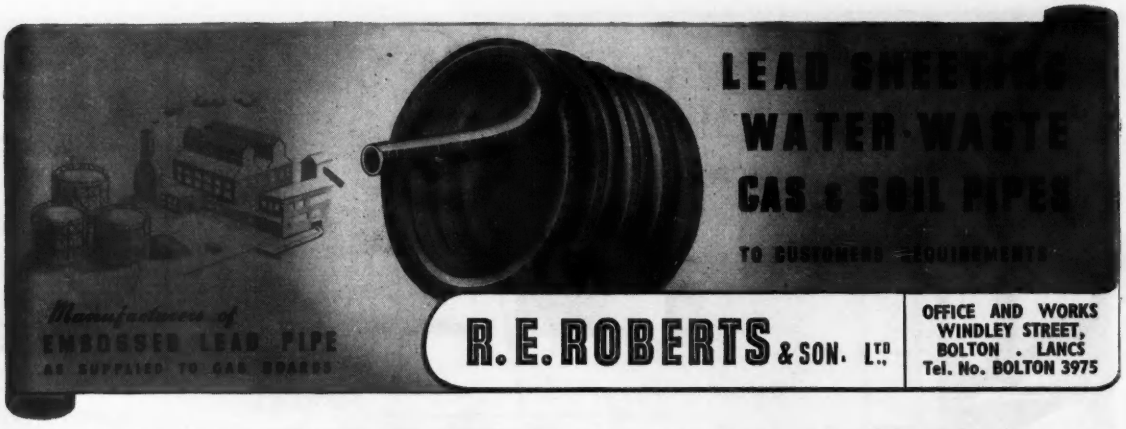

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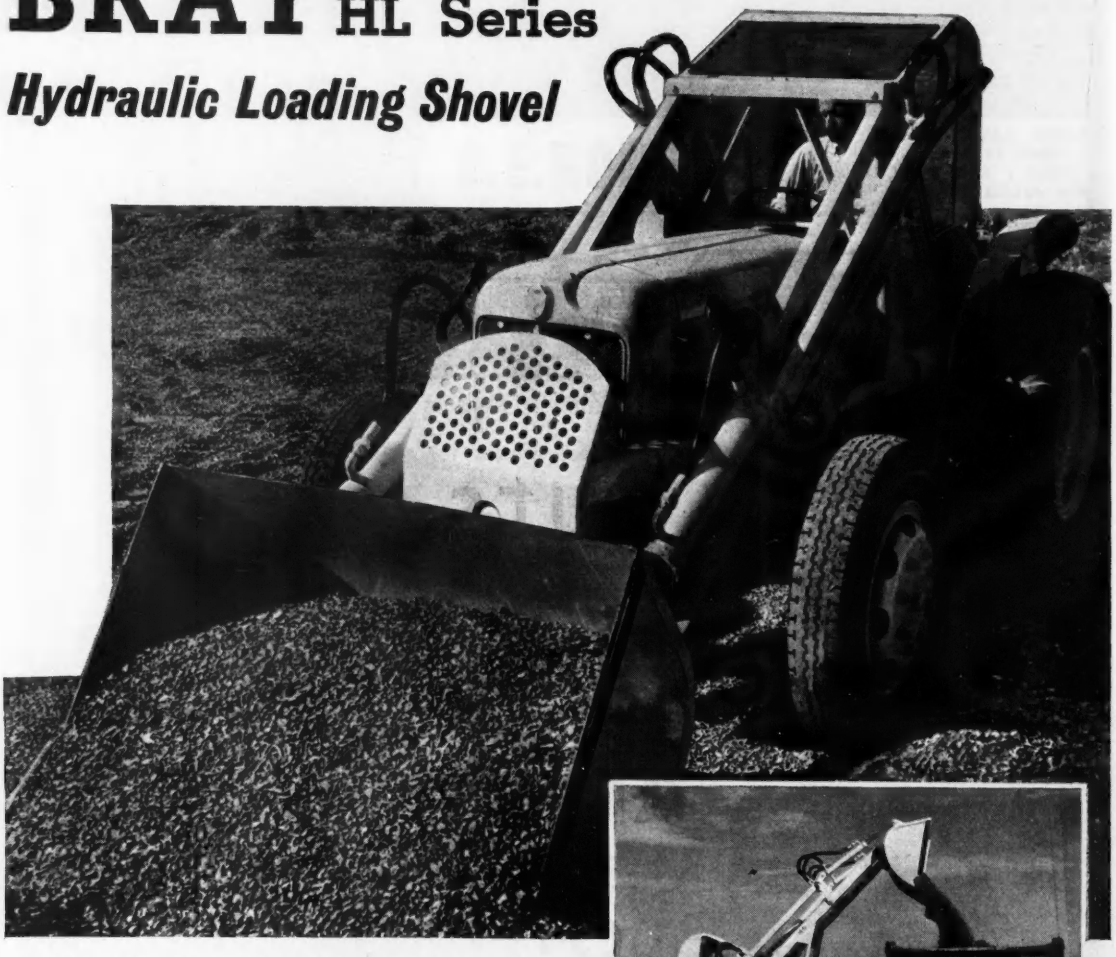

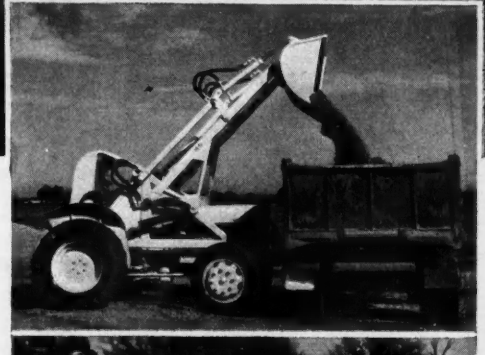

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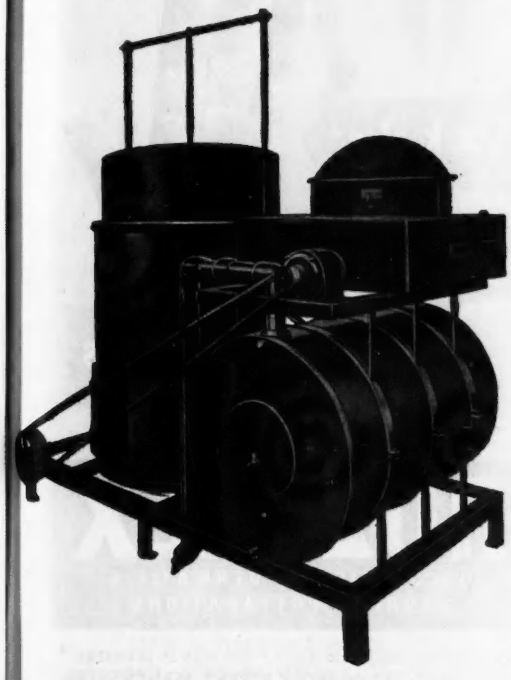

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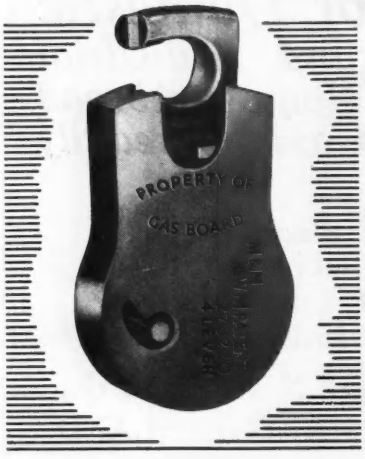

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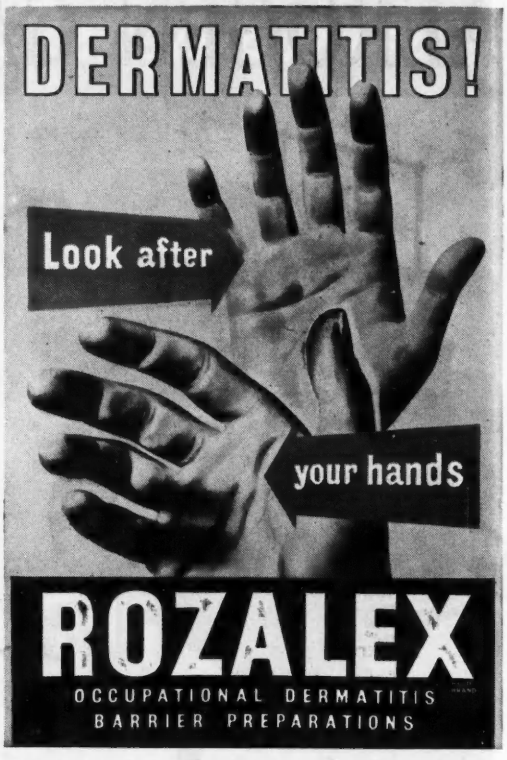

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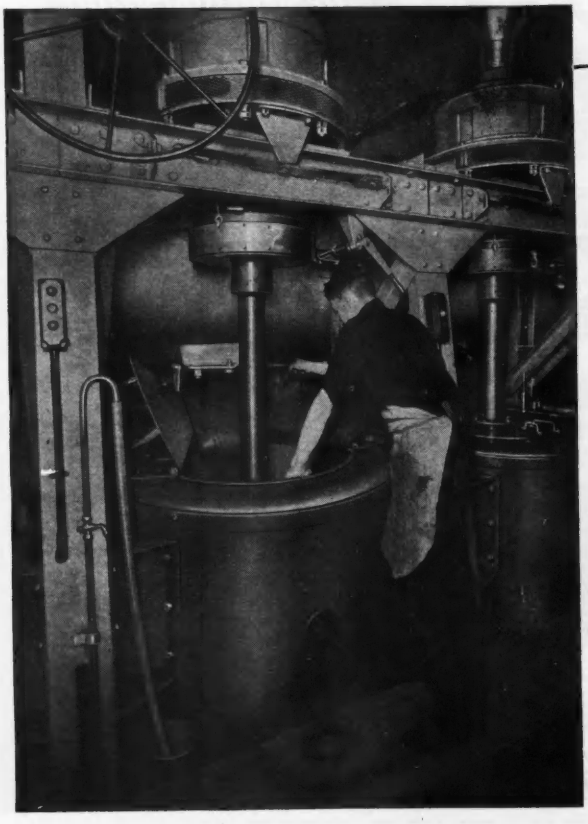

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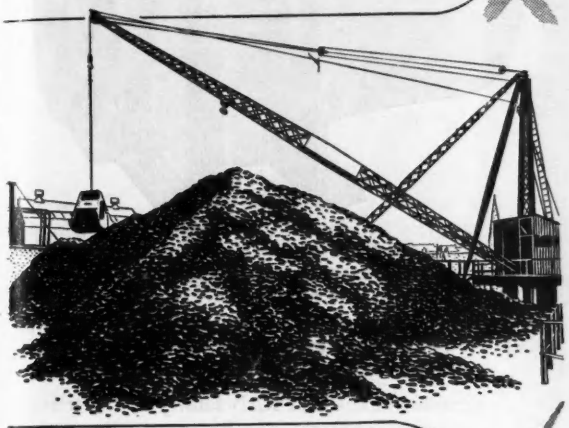

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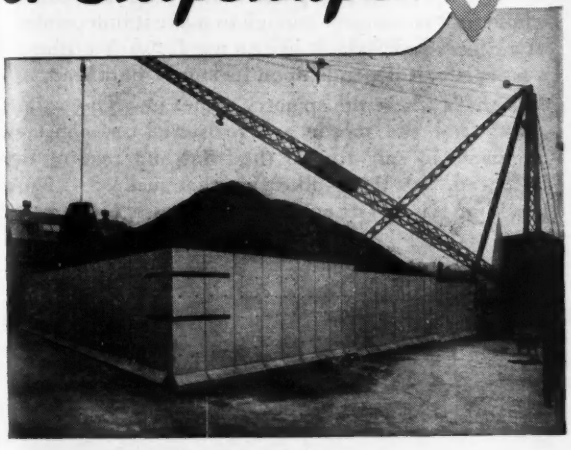

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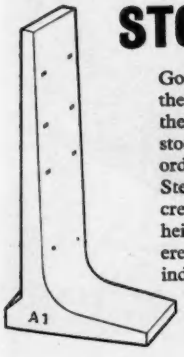

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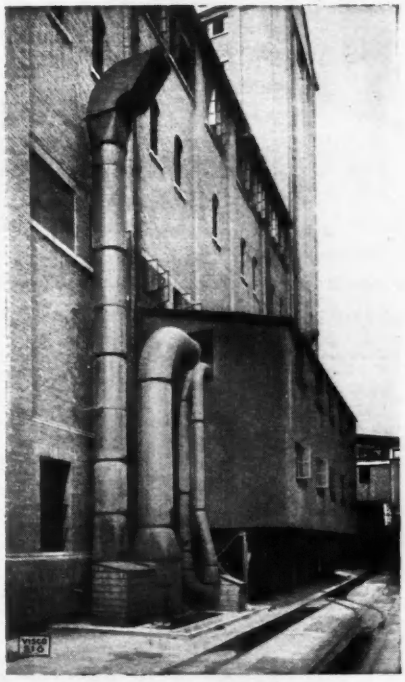

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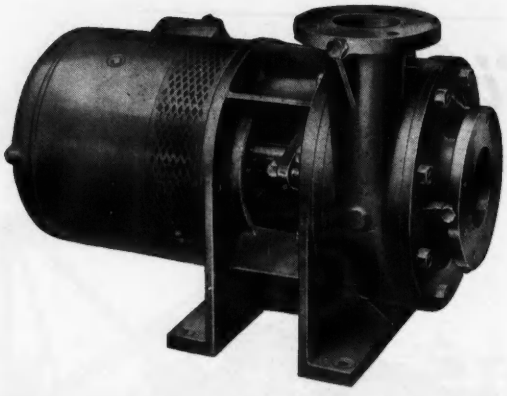

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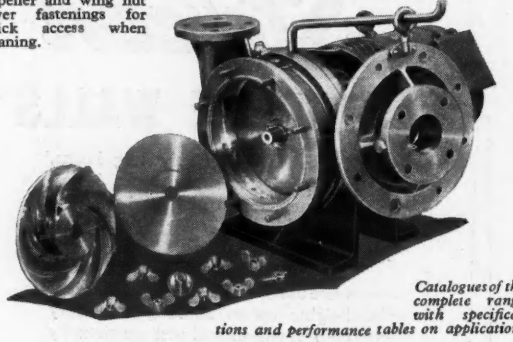

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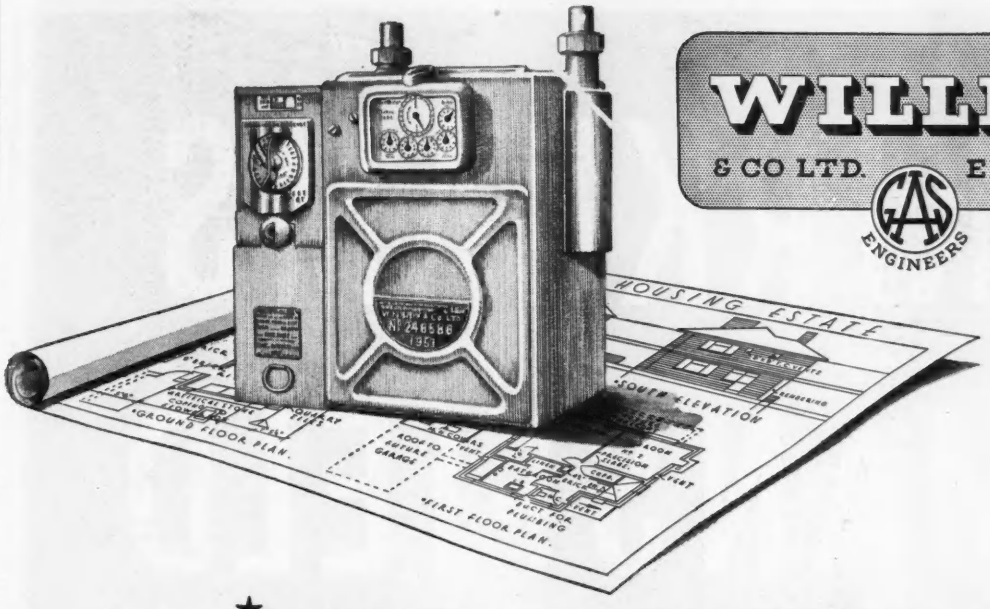

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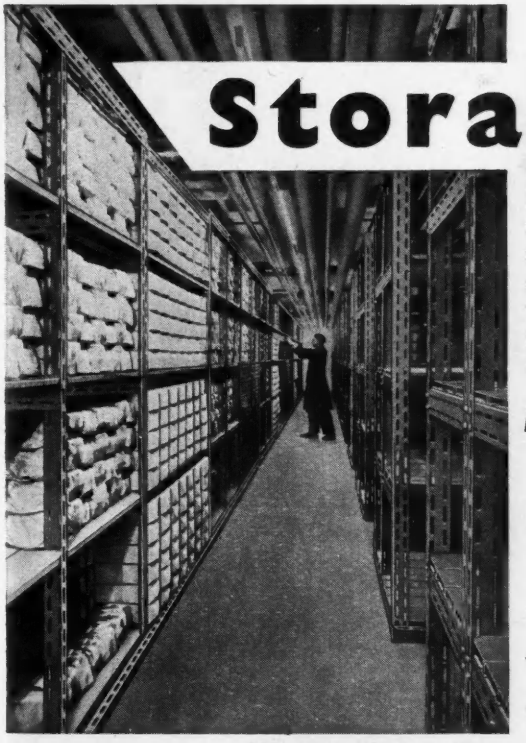

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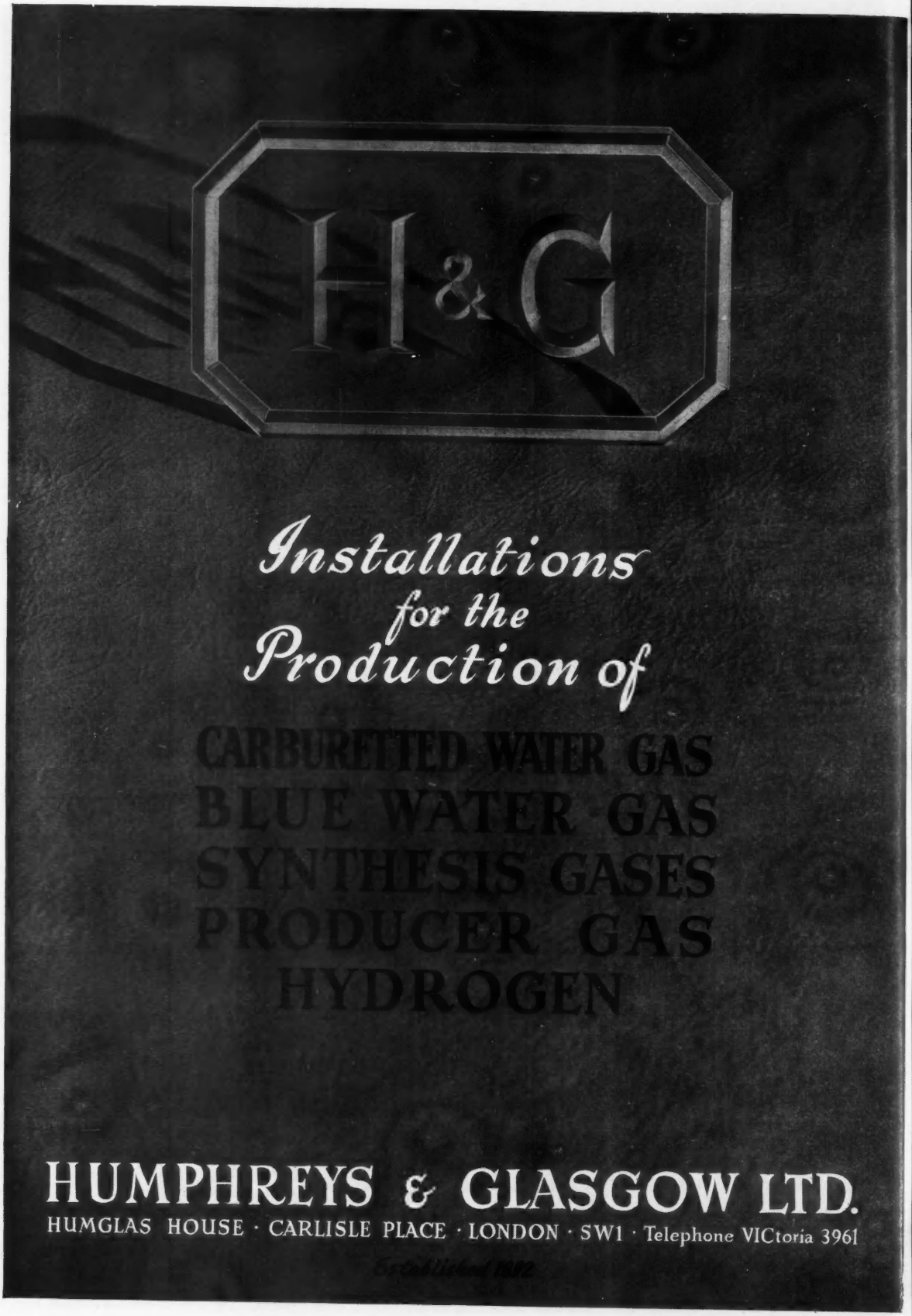
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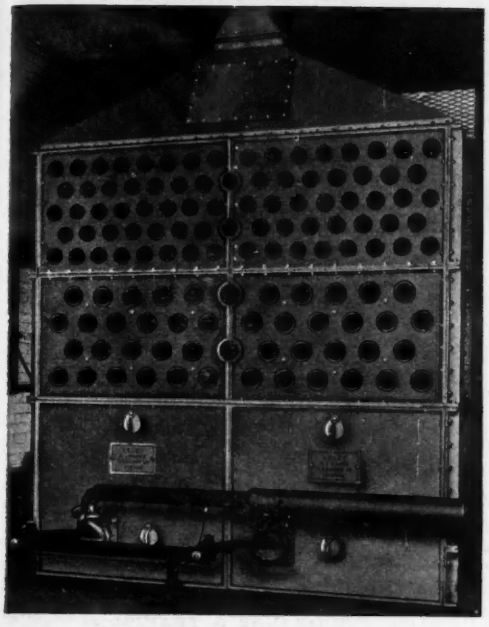

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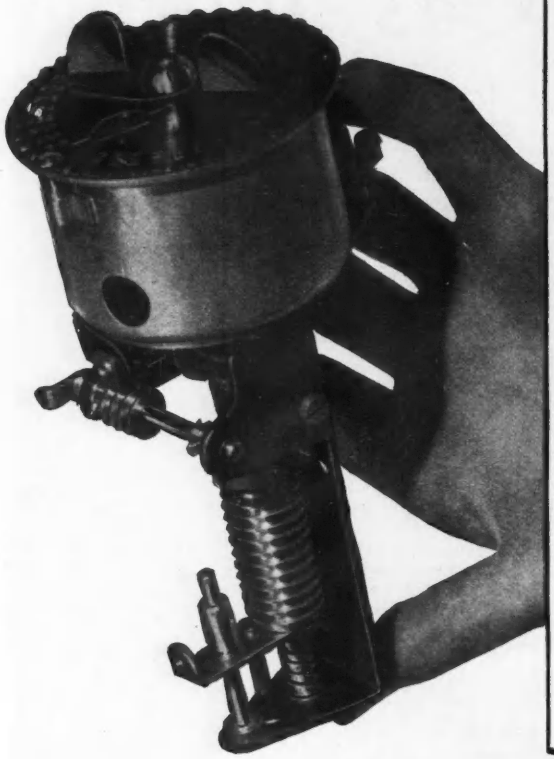

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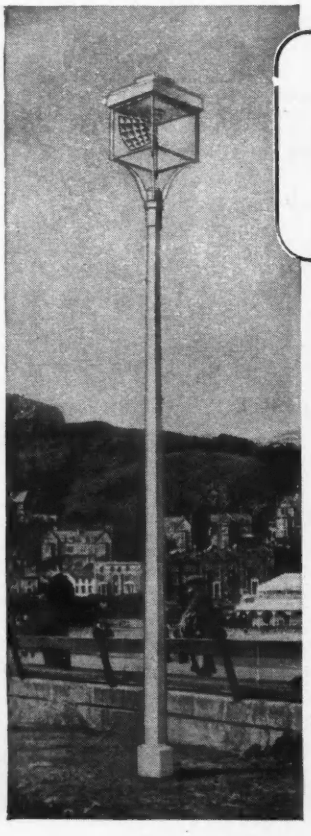

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GAS JOURNAL

VOL. 271. No. 4657 104TH YEAR SEPTEMBER 3, 1952

NEW TECHNIQUES IN FRANCE

IN view of the approaching exhaustion of our coal supplies, particularly of the standard gas-making coals, and in spite of the fact that we in Britain may not be seriously affected in this way in the immediate future, it is interesting and instructive to observe the evolution of new methods of gas manufacture in countries where these shortages are already being felt. Necessity is the mother of invention and nowhere is she more prolific than in the fertile genius of our colleagues in France. M. Delsol, whose title we may translate as Chief Production Engineer to Gaz de France, described in the paper he presented to the International Gas Union at Brussels new techniques in gas production and purification designed to meet the relative poverty of his country in indigenous gas-making coals, the consequent necessity to make use of leaner varieties of coal, the pressing demand for hard coke from the steel industry, and in general the utilisation of every other available type of fuel to maintain the supply of gas (and coke) to the consumer, domestic and industrial. Natural gas, petroleum oils, and refinery gases have been pressed into service and these, together with the developments of producers, water gas, and complete gasification plants, have been used in the solution of the problems of the peak load.

The attitude of the French gas engineer to the national fuel policy and the cordial co-operation of all other fuel interests from the Government downwards are wholly to be admired. Useless competition appears to be entirely eliminated and all are working together in the solution of the fuel problem as a national whole. The reorganisation of the gas industry has facilitated the profitable concentration of the means of production, the more effective co-ordination of supply of raw materials (coal, oil, and petroleum gases) and the utilisation of supplies of gas from allied industries—coke ovens, natural gas, and the tail gases from oil refineries. The last named is coming more into use as the policy of the establishment of petroleum refinery in the market instead of on the oilfield becomes more generally adopted—a development which is already making itself felt in Britain also.

M. Delsol recalls that at the time of nationalisation French gasworks were producing 36% of their output in horizontal retorts, 26% in continuous verticals, 18% in intermittents, 9% in inclined chambers, and 8% in horizontal chambers or coke ovens. Before the war coals rich in volatile matter or coke properties were almost exclusively used but during 'certain periods of penury' lignite, peat, and wood had been used as substitutes. Gas was generally made at 524 B.Th.U. per cu.ft. reduced to 470 B.Th.U. for sale. From much lower figures in the emergency years calorific value has now been established at 440 B.Th.U.—a figure which allows a very free use of diluent gases. In the course of the last two years many gaseous mixtures, capable of more or less direct substitution for the diluted coal gas which constitutes the classic town gas, have been prepared not only by the distillation of coal or by the carburetting of water gas, but by the application of the techniques of cracking and reforming, thermal or catalytic, to a variety of prime materials such as natural gas, propane, refinery gases, and petroleum oils.

New techniques in the production of coal gas have been directed to the utilisation of feebly coking coals in coke ovens, improvements in the quality of the coke made, and finally in some innovations in gasworks practice. It is the last upon which we wish to comment here. Three examples are given. An installation of 28 Woodall-Duckham 103-in. continuous vertical retorts in two benches at Marseilles has been designed and put to work with secondary air recuperation. The heating is by outside Marischka producers using coke graded from 8 mm. to 23 mm. and the fuel consumption on

test, making gas at about 440 B.Th.U. per cu.ft. from Sarre coals, was 14.2% dry coke by weight of coal carbonised.

The Gilly system, built by the Cie. Gle de Construction de Fours at Limoges, is something quite new. Its originality lies in the fact that its system of recuperation is constituted by a series of vertical gasification chambers side by side with the carbonising chambers, taking the place of the producer in the setting, and the secondary air recuperator, the latter being replaced by metallic recuperators (which are effective and take up little space) followed by a waste heat boiler. Across the setting there are two sets of heating chambers, combustion chambers between the carbonising chambers or retorts proper, and waste gas circulating chambers (with a supplementary supply of fuel gas useable at will) between the distillation chambers—retorts, that is, in which coke is gasified in air and steam. In other words, the bench contains two lines of retorts; intermittent vertical retorts upwardly heated in one line, and the other line, each retort filled with graded coke, downwardly heated externally mainly by products of combustion. This combination provides three different gases—coal gas, water gas, and producer gas—with very great resulting flexibility. The incorporation of the whole of the gas produced in the coke-gasifying retorts with coal gas necessitates enrichment which is either by propane or by cracking petroleum oils in the distillation retort. The daily output per retort can thus be increased almost instantaneously by 25% or still more by the addition of propane. One would not think that the gasification of coke in an externally heated vessel would be very effective, but the guaranteed production of about 16,500 cu.ft. per ton at around 440 B.Th.U. per cu.ft. with a fuel consumption of 12.5% 'pure carbon' is considered satisfactory. The plant consists of 10 retorts or chambers heated by external producers.

The third example of new carbonising plant, installed at Cherbourg, is also known by the name Gilly. It consists of two tiers of horizontal chambers each of 1.5 tonnes capacity. Its originality consists in the system of heating and recuperation. The combustion chambers are fed by several burners in line, externally controlled. Secondary air is heated in the walls between, and cold producer gas is heated in metallic elements exposed to the products of combustion on their exit from the setting. It is claimed that fuel consumption is slightly less than that of intermittent vertical retorts of 2 tonnes capacity.

MEETING PEAK LOADS

WE have already referred to the increasing rôle played by the coke oven, both as installed in the gasworks and as a supplier of surplus gas from the coking and steel industries. Much interesting work is going on in the perfection of blending aimed at the inclusion of a wider range of coals. Some details of this practice will be found in our feature 'Gas in France.'

To meet the demands of peak loads improvements are being made in the design of producers particularly in their mechanisation and their automatic control. And the use of propane and of heavy oils in the carburetting of water gas is being rapidly developed in specialised plants. Several installations for the complete gasification of non-caking or lightly caking coals have been brought into commission generally with enrichment by propane. By suitable adjustment the gas produced can be mixed in considerable proportions with coal gas without deleterious effect on combustion characteristics.

In the same direction methods of cracking and reforming, petroleum derivations, thermally and catalytically, are being brought into use. They follow those in use in the United States. They include the gasification of oil in vertical retorts on the lines practised in this country and the making of oil gas in such processes as that of Hall have been adopted either as peak load gas or for the enrichment of low grade gases. Several of these are described in some detail in M. Delsol's paper.

Innovations in purification, physical and chemical, have been slower. The electro-detarrer is coming into use. The tower purifier and the mechanisation generally of oxide purification are being developed. Fluidisation methods are not being neglected. Some coking plants are using methods of liquid purification but none claims the complete removal of H_2S. The treatment of gas under pressure is the most recent and important development. One example is of coke oven gas which is compressed to 5 kg. per cu.m. (say 70 lb. per sq. in.), removal of naphthalene by washing in oil, dry purification in towers, and a final washing for naphthalene, followed by dehydration by refrigeration at +5°C. at the pressure of transmission.

M. Delsol sums up the position in the remark that the task of the gas engineer no longer consists merely in that of the distillation of coal but rather the application of a science embracing the preparation and conditioning of a certain number of gases, base load, supplementary, and peak load, dominated by the aim to produce at the lowest possible price a gas for sale with combustion characteristics suitable for use in the best conditions, making use of all the forms of fuel—solid, liquid, and gaseous—which are actually available.

HIGHER COAL STOCKS

FIGURES issued by the Ministry of Fuel and Power show that the total saleable output of deep-mined and opencast coal during the week ended August 23 was 4,195,100 tons. This is an increase of 197,400 tons over the total for the previous week, but 67,900 tons less than in the corresponding week of last year, in spite of the fact that there are more than 21,000 more workers in the industry. The week's production brings the total for the first 34 weeks of this year to 144,487,200 tons, against 142,461,600 tons in the first 34 weeks of 1951. Tonnage lost during the week due to recognised holidays was 66,200, compared with 137,100 tons a year ago, but 74,000 tons was lost through disputes, compared with 11,300 tons in the same week of 1951. Absenteeism was 13.85%, 1% more than in the corresponding week last year. Total distributed stocks

rose to 17,336,000 tons (13,597,000 a year ago). At gas-works there were 3,152,000 tons, equivalent to 4.9 winter weeks' consumption, compared with 2,314,000 tons (3.7 weeks) in 1951.

CROSS-CHANNEL ELECTRICITY

In an article in the *Electrical Times* a broad assessment is made of the possibilities of the scheme—approved in principle by the British Electricity Authority—for a cross-Channel link with Electricité de France. Assuming that the overall cost of the scheme would be £4 mill. and the plant saving due to interconnection would be in the neighbourhood of 100 MW, the saving in capital cost alone would be £2 mill. (taking power station costs at £60 per kW of installed plant). The saving in plant would be made possible by the diversity between the peak demands of the two systems. Owing to the non-coincidence of the peak demand, power is available in one or other of the countries to supply a proportion of the peak demand in the other. The article goes on to point out that France has a considerable amount of hydro-power, located mostly in the south, and a fairly large steam power system in the north. Taking a yearly basis, the hydro power is, due to seasonal fluctuations in rainfall, variable in nature; the steam plant output is also variable due to the necessity for periodic overhauls. However, at certain periods the French system will have available spill power, and short-term power is practically always available from the hydro plant which can be usefully employed in overcoming peak-load difficulties in this country. This power, it is argued, can in turn be repaid by export from Britain, which by adjustment of the power flow on the French network can be used to relieve hydro stations which can then conserve water. Two sets of circumstances may arise. One when all reservoirs in France are full to overflowing with spill power available, which will give coal saving both in France and Britain. The other when water power may be scarce but available on a short-term basis at the time of the British peak load, with the return of the energy at times which would enable water to be conserved in France. The article to which we refer discusses certain technical considerations into which it is not germane to enter here. But the system of cross-Channel linkage certainly holds fascination in this era of integration of energy and fuel supplies.

PLEASANTNESS OF ENVIRONMENT

For long it has been suggested that one of the requirements for comfort in a room is that the walls should be somewhat warmer than the air. The statement has been made without supporting experimental or observational evidence, and it is interesting therefore to turn to an article by Dr. Thomas Bedford, of the Medical Research Council's Environmental Hygiene Research Unit, London School of Hygiene and Tropical Medicine, published in the Year Book of the Heating and Ventilating Industry. In that article Dr. Bedford refers to recent experimental work by Munro and Chrenko carried out at the Building Research Station, for which 145 members of the Station staff volunteered as subjects. Experiments were made at three levels of equivalent temperature, 60°, 65°, and 70°F., and at each of these temperature levels three sets of conditions were tested—one in which the air and the surrounding surfaces were at the same temperature, one in which the surfaces were about 5°F. cooler than the air, and the third in which the walls were 3° to 4°F. warmer than the air. Each volunteer was exposed for upwards of an hour and a half to each of the wall-air temperature combinations at a given equivalent temperature. Thus the subjects were divided into three groups according to the equivalent temperature to which they were exposed. Consistently they experienced feelings of greater freshness (or less stuffiness) in the warm-wall situation than in that with air and walls at the same temperature, and the cold-wall environment seemed to be the stuffiest of the three. At the end of the experiments 72% of the subjects declared that they found the warm-wall situation to be the pleasantest of their three exposures, 15% were undecided, and only 12% preferred the condition with cold walls. This constitutes an argument in favour of judiciously designed radiant heating installation; it is also an argument in favour of adequate thermal insulation of buildings. With given indoor and outdoor temperatures the internal surfaces of a heated building will obviously be warmer with the better insulation.

SHOW BOAT

The old story of Mohamet and the mountain finds new interpretation in the latest proposal to take the B.I.F. on tour abroad. The idea springs from a realisation that poor attendance of overseas buyers is losing the faith of British manufacturers in the Fair in its present form—more especially the London section, for there is at the moment no suggestion to take the heavy industries section at Castle Bromwich on tour, though no doubt some of the latter exhibits might well be included in the 'show boat.' The scheme, which has been submitted by Mr. Richard Levin, chief designer of the Festival of Britain travelling exhibition, envisages the fitting out of seven exhibition ships to tour the world. Five of these would be divided into trade groups, while the other two would serve as hostel ships. Hold space could be let to exhibitors for storage of their goods so that whole or part orders could be met immediately. A staff would travel from port to port in advance of the exhibition selling tickets and setting up an entrance exhibition on the dock-side. The scheme provides for 1,500 exhibitors, who would pay an average of £2,000 each for an eight months' cruise. The exhibition would not stay in any one port longer than 10 days.

Judging by the amount which firms have to pay for space at home exhibitions, this sum seems remarkably modest for a world cruise, and one wonders to what extent the scheme would have to be subsidised. But even if it did have to carry some Government assistance it would seem to be money well spent in carrying Britain's shop window to Europe, the Americas, and the East.

While the plan as applied to 20th century commerce is somewhat unusual, the basic idea is by no means new. From the earliest times we have records of the ancient trading nations carrying their wares across the seas to their markets. Indeed, this was practically the only means of selling them. Much nearer our own time we have only to recall the success of the Festival travelling exhibition ship, already referred to, and have to look back but a few weeks to an example of promoting goodwill and 'selling' the 'holiday in Britain' idea by the extended tour in the States of several London 'buses. There is no doubt that in these highly competitive days we have to go out and sell. No number of home exhibitions and fairs, however lavishly conceived, will in themselves succeed in marketing our goods abroad. We await with interest the reactions of industry to the proposal which is now being considered by a committee of the Federation of British Industries.

Personal

Mr. J. B. MacRae Smith, Deputy Engineer and Manager, Vale of Leven District, Alexandria, Scottish Gas Board, has been appointed Engineer and Manager, Oswestry District, West Midlands Gas Board.

◇ ◇ ◇

Mr. Bernard Clarke, General Manager, Lincolnshire Division, East Midlands Gas Board, has been appointed a magistrate for Lincoln. A former Mayor of Stamford, Mr. Clarke also sat as a magistrate on the Stamford Borough Bench.

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Mr. Philip W. B. King, of the *Gas Journal* and *Gas Service*, was on Saturday last married to Miss JUDITH ARCHER, daughter of Mr. and Mrs. Brian Archer, of Fingringhoe, nr. Colchester. The marriage was at Lexden Parish Church, and the subsequent reception at the Colchester Garrison Officers' Club.

◇ ◇ ◇

Mr. C. S. Jordan has been appointed Manager of the Birmingham branch of Crypto, Ltd., North Circular Road, London, N.W.10. The branch controls sales and service throughout the West Midlands Area from 198, Corporation Street, Birmingham. Mr. Jordan, who joined Crypto in September, 1949, has been General Sales Division Representative for Hampshire.

◇ ◇ ◇

Alderman G. H. Jones, O.B.E., Deputy Chairman of the West Midlands Divisional Coal Board, who is 68, is retiring at the end of September, and has accepted an invitation to remain on the Board as a Part-time Member. His successor will be **Mr. T. S. Charlton,** at present Production Director of the Board's South Western Division at Cardiff. Mr. **G. S. Morgan,** Area General Manager of the No. 4 (Aberdare) Area of the South Western Division, will succeed Mr. Charlton as Production Director.

Obituary

Mr. W. S. Ault, a Director of the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd., died on August 27 at the age of 60 following an operation he underwent a few weeks ago. Mr. Ault joined the staff of the Company in 1914 and for many years held a senior position in the Construction Department. He was appointed to the Board of the Company in 1946 as Director in charge of the drawing office and built it up to its present size. He was also responsible for the Company's training schemes for draughtsmen and engineers. For many years Mr. Ault played an important part in the evolution of the Company's design practice.

1952 'Journal' Directory

THE following changes have been notified during the past month. To keep the information in the 1952 edition of the *Gas Journal Calendar and Directory* up to date readers are invited to note these alterations (together with the appropriate adjustments relating thereto in the 'Personal' section of the *Directory*, pp. 141-156):

Page 21.—MINISTRY OF FUEL AND POWER: *Permanent Secretary*, Sir John Maud vice Sir Donald Fergusson; *Under Secretary* in charge of Gas Division, K. L. Stock vice R. Kelf-Cohen, C.B.

„ 79 and 82.—SOUTH EASTERN GAS BOARD: We were in error in stating in the *Journal* of August 6 that Mr. T. W. Gibson has succeeded C. Stott as Deputy Chief Engineer. He has, in fact, succeeded Mr. Stott as Divisional Engineer, Metropolitan Division.

„ 105.—WALES GAS BOARD: Add *Manager*, South Wales Grid, T. S. Ricketts.

„ 105 and 110.—PEMBROKESHIRE GROUP: Add *Deputy Chairman*, Darrell W. Rees, M.B.E.

„ 59.—NORTH WESTERN GAS BOARD: Add *Chief Medical Officer*, Dr. G. O. Hughes, M.C.

„ 130.—PETERHEAD: Delete E. V. Chalmers, DIST.M., deceased.

„ 121.—OSWESTRY DISTRICT.—J. B. MacRae Smith, E. & M.

Diary

Sept. 10.—South Western G.C.C.: 34, Bridge Street, Taunton, 11 a.m.

Sept. 11.—Scottish Association of Gas Managers: Annual General Meeting, Barrfields Pavilion, Largs. (Golf and bowling competitions September 10; Wemyss Bay-Kyles of Bute excursion September 12).

Sept. 15.—Eastern G.C.C.: Connaught Rooms, Kingsway, W.C.2, 2 p.m.

Sept. 15-19.—Association of Public Lighting Engineers: Annual Meeting and Exhibition, Harrogate. Exhibition of public lighting equipment, Gas Council exhibit, Stand No. 9.

Sept. 16.—Irish Association of Gas Managers. Annual Meeting, Londonderry. (For programme see *Journal* of July 30, p. 237.)

Sept. 17.—Wales and Monmouthshire Section, I.G.E.: Third Annual General Meeting, Ruthin.

Sept. 25.—North Thames G.C.C.: Westminster City Hall, Charing Cross Road, W.C.2, 2.30 p.m.

Sept. 26.—North of England Section, I.G.E.: Meeting at Newcastle-upon-Tyne. Paper by K. E. Brown, 2.15 p.m.

Sept. 26.—Manchester and District Section, I.G.E.: Visit to Robert Dempster and Sons Ltd., Rose Mount Ironworks, Elland, Yorks.

Sept. 27.—Eastern Juniors: Meeting, Great Yarmouth.

Sept. 29.—West Midlands G.C.C.: Queen's Hotel, Birmingham, 2.30 p.m.

Sept. 30.—Manchester District Juniors: Extraordinary General Meeting, Manchester, 6.30 p.m.

Oct. 1.—Institution of Heating and Ventilating Engineers: 'Industrial Radiant Heating,' F. R. L. White, Vice-President, at the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m.

Oct. 4.—Yorkshire Juniors: Annual General Meeting, Leeds.

Oct. 4.—Scottish Juniors (Eastern District): Meeting. Presidential Address by T. R. Cameron.

Oct. 7.—Midland Juniors: Meeting. Presidential Address by D. J. Ward.

Oct. 8.—South Western Section, I.G.E.: Annual General Meeting, Taunton. Paper by T. H. Pardoe.

Oct. 10.—London and Southern Juniors: Meeting. Presidential Address by C. D. Shann.

Oct. 11.—Manchester and District Juniors: Annual General Meeting, Blackpool.

Oct. 11.—Manchester Juniors: Annual General Meeting, Blackpool. Presidential Address of A. K. Howell.

Oct. 17.—Midland Section, I.G.E.: Visit to Four Ashes works of Midland Tar Distillers.

Oct. 21.—Midland Juniors: Meeting. Paper by C. P. Astbury.

Oct. 21.—London and Southern Section, I.G.E.: Annual General Meeting, London.

WALTER KING PHOTOS.

We have pleasure in announcing the appointment of

MR. STEPHEN TENNANT

as our Staff Photographer.

Mr. Tennant took up the professional study of photography after graduating at Cambridge. Since the war, in which he served with commissioned rank in East Africa, he has had a wide range of commercial experience. He is a member of the I.B.P. and an Associate of the R.P.S. He will take up the appointment on September 8.

Visits to the Midlands and North-West are planned for later in the month, and enquiries for work in those areas should be sent as early as possible.

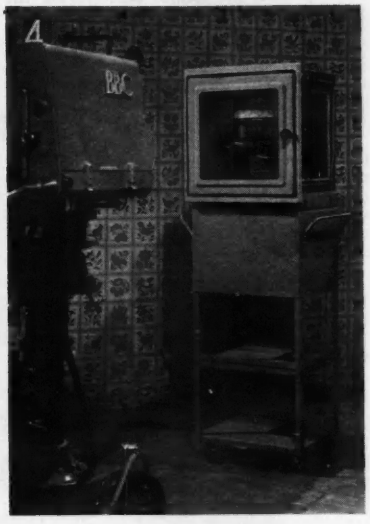
GLASS GAS OVEN FOR TELEVISION

OUR photograph shows the glass gas oven, mounted on a stand at camera height, which has been specially designed and made by Radiation Ltd. for television cookery features, and which was used for the first time by Philip Harben in a demonstration on the evening of August 8. It is fitted with Regulo control so that normal settings and cooking times apply.

A set of detachable panels is provided and any combination of these can be affixed to provide suitable background for any viewing position. The inside finish of the side and back panels is matt grey, and glossy cream on top.

Except in the case of the oven base the glass walls of the oven are double panelled and if it should be desirable to clean the inner surface of the panels the outer pane can be removed for this purpose.

The grid shelf supports are detachable so that only those required for any particular cooking operation need be in position at the time.



British Wood Preserving Association

THE British Wood Preserving Association has decided to hold its 1953 convention in June. To provide accommodation for the number of delegates likely to attend and to ensure that the official reception and dinner can be held in College, the Secretary has made arrangements for the convention to be held at Trinity College, Cambridge, from June 23 to 25. Delegates will assemble for lunch on June 23 and the opening session will be held at 2.30 p.m.

Mr. C. S. White, F.R.I.B.A., has been appointed by the Royal Institute of British Architects as the Institute's representative on the Executive Committee of the Association. Mr. White is a partner in the firm of Ramsey, Murray, & White, 32, Wigmore Street, W.1.

Major John Stirling has resigned from the B.W.P.A. Council owing to his inability to attend meetings in London. The vacancy has been filled by the appointment of Sir John Stephenson, Chairman of the Eastern Gas Board.

Northern First Aid Competition

A FIRST AID competition was held in Middlesbrough on Saturday, August 23, between teams from the Middlesbrough, Stockton and Darlington divisions of the Northern Gas Board, the winning teams from which will take part in the area finals to be held in Newcastle-on-Tyne on September 20. The team from the Middlesbrough unit of the Middlesbrough division gained first place in the competition with Darlington 'A' and Hartlepools second and third respectively.

Much interest was shown in the competition and there was a very good attendance of employees from the three divisions. Mr. John W. Pallister, Middlesbrough Divisional General Manager, presided, and the Mayor, Alderman L. Taylor, presented the certificates to the winning teams.

Scottish Association

THE annual meeting of the Scottish Association of Gas Managers will be held at Largs on Thursday, September 11, under the presidency of Mr. E. G. Smith, Glasgow division, Scottish Gas Board.

The William Young Memorial Lecture will be given by Dr. Harold Hartley, C.B.E., his subject being 'Domestic Space Heating and the National Economy.' A paper on 'Industrial Gas' will be presented by Mr. A. Bujnowski, Sales and Publicity Officer, Glasgow Division.

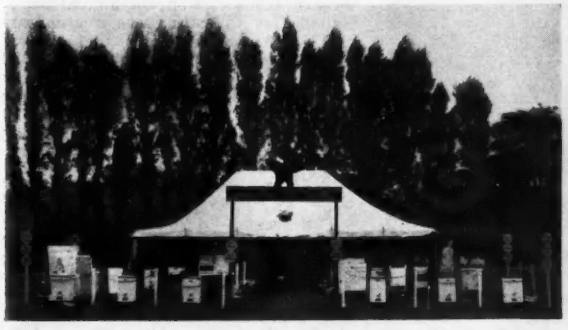
A Reception and Dance at the invitation of the Scottish Gas Board will be held on the Thursday evening and for the Friday a steamship cruise has been arranged. The Golf Competitions will take place on Wednesday, September 10 —for men, over the course of the Glasgow Golf Club at Gailes, and for ladies over the course of the Largs Golf Club. A Bowling Competition has also been arranged for the Wednesday.

Five-Day Week Urged for Gas Industry

ONE of the final acts of the conference of the Confederation of Shipbuilding and Engineering Unions at Southsea was to endorse a demand for a five-day week in the water and gas industries, moved by the Amalgamated Engineering Union. The President (Mr. H. G. Brotherton) said there were peculiar difficulties in service undertakings, but they had never failed when they had met the gas and water people on any occasion to claim the five-day working week.

A resolution instructed the Confederation's Executive Council 'to take all steps open to them' to secure these conditions. Mr. W. J. Carron, of the A.E.U., said the five-day week operated in other industries where continuous processes were involved, and there was no reason why it should not be introduced in gas and water undertakings.

FROM NORTH AND SOUTH WITH MR. THERM AT THE SHOWS



From opposite ends of the country we reproduce photographs of recent shows in which the gas display proved an outstanding attraction. The Stockton Agricultural Show drew 13,000 visitors from a wide area and was one of the most successful held in recent years. A view of the Northern Gas Board's display is shown on the left. At the Bemerton Flower Show, Salisbury, the Southern Gas Board arranged a colourful canvas-topped stand (illustrated on the right) which was completely erected in half a day and cleared away afterwards in three hours, showing a great saving in time and effort compared with the more usual type of marquee. Excellent business was done at both these shows.

American Scientific Equipment

MORE than £350,000 worth of new scientific equipment has been supplied recently by the American Government to British research laboratories working to develop better and cheaper industrial and consumer goods and to find new uses for waste products. A partial list of these supplies has been issued by the Mutual Security Agency.

The Fuel Research Station of the D.S.I.R., in common with the Chemical Research Laboratory, has received 'Hyd-Robot' automatic low-temperature fractional analysis apparatus and accessories (Podbielniak Inc., Chicago). One of the major programmes of research at this station is on the synthesis of hydrocarbons by the Fischer-Tropsch and similar processes. A particular advantage of the process is the wide variety of products that are possible. An important possibility is the use of cheap coal, available, for instance, in Africa, for the production of petrol and other oil fuels in substitution for costly imports. This equipment is being used for the complete analysis of the complex mixture of gases produced during the process.

This station has also received a centrifugal molecular still (Distillation Products Inc., Rochester), for determining the composition of certain of the products from the synthesis of oil from coal by the Fischer-Tropsch and other processes, oils from the carbonisation of coal, and waxes from indigenous peats and lignites. In general, it will speed up the laboratory's work on the utilisation of indigenous materials as a source of industrially important hydrocarbons.

Other work will be much simplified by a Brabender semi-automatic moisture tester (Brabender Corporation, Rochelle Park, New Jersey). This is being used to determine the moisture content of coal samples and can finish a complete test in the time it took to weigh a sample by previous methods. The instrument takes 10 specimens at a time, and operation is extremely simple. One advantage of the instrument, apart from its speed, is that it dries off the moisture so rapidly that it is accomplished before oxidation takes place.

Preston Guild Merchant

THE right to hold a Guild Merchant was granted to Preston probably around 1100, but certainly by a Charter from Henry II in 1179. With only a break due to the second world war, Preston has celebrated her Guild through strife and pestilence, good times and bad, once every 20 years for the past four centuries. This year is Guild Merchant year, and the week's celebrations opened on August 30 with the traditional proclamation by the Guild Mayor.

The North Western Gas Board has played an appropriate part in the events of the week. At the Guild Industrial Exhibition at Moor Park the Board arranged a display of commercial and industrial appliances, including overhead space heating, boiler plant, infra-red drying equipment, oxy-coal gas cutting machines. A special feature is a new type of pottery furnace, and students from a local art school demonstrate the moulding and firing of pottery.

In the Trades Procession, which consists of nearly three miles of exhibits, the Board is entering two motor vehicles mounting tableaux—the one purely historical, depicting King James knighting 'ye sirloin' at Hoghton Tower in 1617 (Hoghton Tower is in Preston), and the other showing Mr. Therm, dressed as a chef, holding a joint with two large gas cookers in the background and the caption: 'Mr. Therm cooks the joints in 39,000 Preston homes.'

Coinciding with the celebrations, the Royal Lancashire Agricultural Show is being held in Ashton Park. Here the North Western Gas Board has a tented stand covering 5,600 sq. ft., showing a wide range of appliances, with cookery demonstrations and films.

The Board is to be congratulated on the active part it has played in connection with this notable occasion, which recurs but once each 20 years.

Visit to Upton Colliery

ON August 15, Mr. G. E. Currier, O.B.E., President of the Institution of Gas Engineers, paid a visit to the Upton Colliery in Area No. 4 of the National Coal Board's North Eastern division. Mr. A. Scott, Area General Manager, by whose courtesy the visit had been arranged, conducted the party round the colliery workings. Inspection was made of the coal cutting and roof supporting system, certain features of which are

being pioneered at this colliery. The President concluded a strenuous visit with a tour of the underground offices. The remainder of the party comprised: Mr. J. Nelson, Area Marketing Manager, Area 4, N.C.B. (who made the arrangements for the visit); Mr. J. R. Harding, Mining Agent, Upton and South Kirkby Collieries; Mr. R. A. Benford, Manager, Upton Colliery; and Mr. C. Cairns, Coal Officer, North Eastern Gas Board. Our photograph shows Mr. Currier (left) and Mr. Harding.

Sir John Cass College

A course has been arranged by the Coal Industry Society at the Sir John Cass College and the L.C.C. College for the Distributive Trades for those who have attended the first and second year lectures in order to complete their preparation for the examination in solid fuels of the City and Guilds of London Institute and the Institute of Fuel.

The lectures in this course on 'Domestic and Industrial Fuel' will be given as a revision and extension of the topics dealt with in the earlier years of the course. A part of each evening will be used for tutorial work and those attending will be expected to prepare reports and answer problems in their own time for discussion during these periods.

The fee for the course, which starts on November 13 and ends on April 30, 1953, is £2, and application for enrolment form should be made to the Principal.

Company News

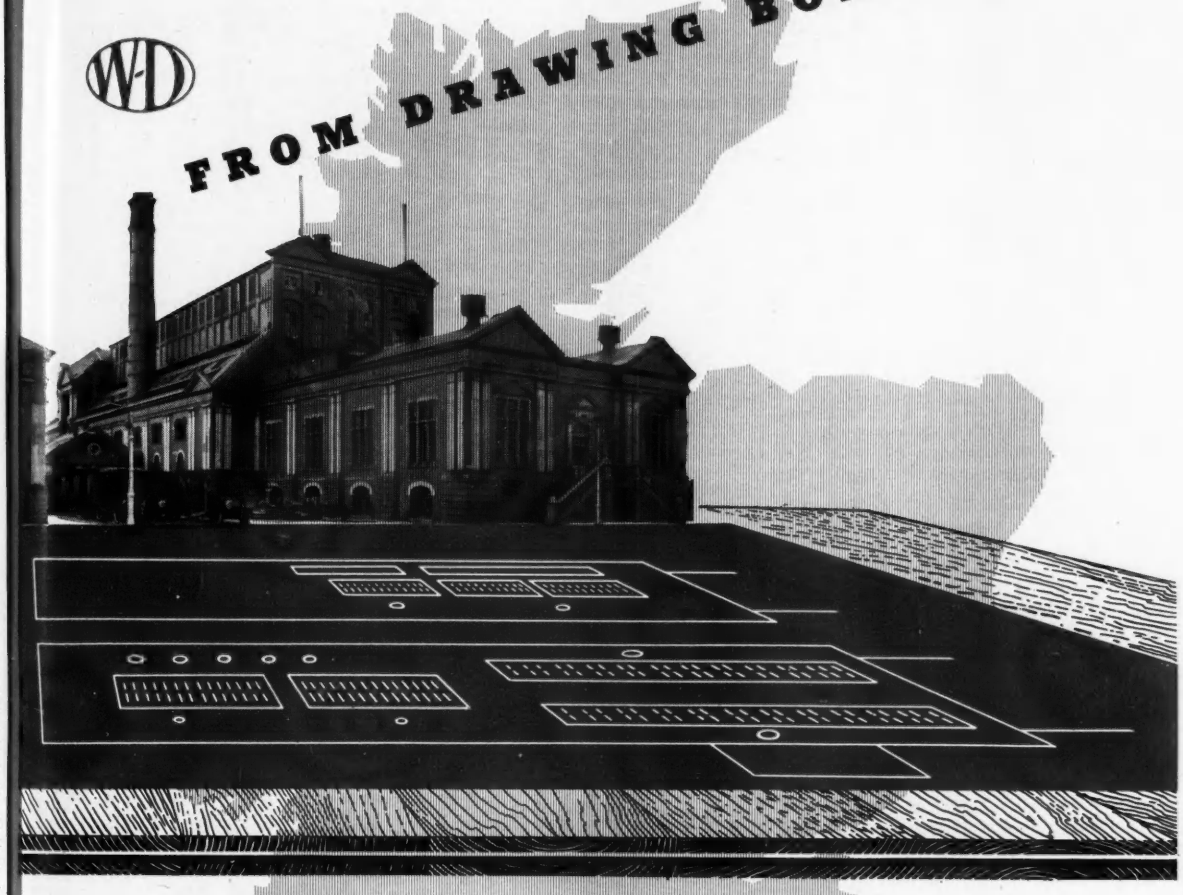
UNITED GAS INDUSTRIES

In the course of his statement to shareholders at the 23rd annual general meeting of United Gas Industries in London on August 26, the Chairman (Lieut.-Col. W. Cabourn Smith, D.S.O.) said the company had again had a very successful year with a record turnover. The trading profit was £657,976—an increase over the previous year of £117,972. After making provision for depreciation, the net profit, before tax, amounted to £570,644. A provision of £21,169 had been made for the maintenance of meters under the guarantee which the company gave on all its meter production. The margin of current assets over current liabilities showed an increase of approximately £100,000. The sum of £80,000 had been transferred to a plant replacement reserve, and the carry-forward was increased by approximately £30,000.

The Chairman gave further details of the proposed acquisition (subsequently approved) of Alder & Mackay, Ltd. He said that to service the new preference and ordinary capital, assuming a dividend of 17%, and taking 5% interest on the cash consideration, the annual cost to United Gas Industries was a gross sum of £28,359. Average profits of Alder & Mackay for the ten years to June 30, 1951, before taxation, amounted to £51,000. Profits, however, had been rising and for the year to December 30, 1951, the profit was approximately £84,000 before taxation.

The Second Edition of the *Directory of Branded Hardware* has recently been published by the *Ironmonger*. In the arrangement a slight alteration has been made, brands in the form of numerals now being shown together at the end of the directory. Upwards of 5,000 additional brand names have been incorporated. Subscribers receive free copies, but they may otherwise be obtained from the *Ironmonger*, 28, Essex Street, W.C.2 (price 6s. each).

FROM DRAWING BOARD . . .



TO GAS BOARD

The No. 2 Retort House at the **Edinburgh Works of the Scottish Gas Board**, in which the Fourth and Fifth W-D Installations, each of 28 – 82" Lambent Heated Retorts, are at present under construction. The building also houses the First Installation of 88 – 76" Downward Heated Retorts. No. 1 Retort House contains the Second and Third Installations of 40 – 103" and 24 – 103" Upward Heated Retorts respectively. Thus there will shortly be a total of 208 W-D Continuous Vertical Retorts at Edinburgh with a coal carbonising capacity of 2,000 tons per day.

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AMERICAN SPOTLIGHT

Items of Topical Interest from the Contemporary Technical Press of Canada and the United States

MOBILE CONFERENCE ROOM

A ROOMY bus is the 'aspirin' for one of Public Service Co. of Colorado's many post-war headaches. Extremely rapid expansion that has more than doubled the company's size since world war II created the problem of maintaining close contact with all employees. This was particularly serious in operating departments, whose employees are seldom near main office conference rooms. Today, the converted passenger bus, jumping from line crews to substations, from gasholders to service crews, carries company messages to every employee.

Developed by the education and information department, the idea enables operating employees to talk about company problems with informed discussion leaders; to learn first-hand why certain policies are being followed in the utility industry and in American government. Safety, job improvement ideas, future planned progress are all discussed informally in the novel conference room.

Besides the great improvement in employee relationships, the bus saves many manhours that would be lost in bringing employees to central meeting places. Results of the informal meetings have been good because groups are small and the informality stimulates discussion that is so often stifled by self-consciousness. The bus is fully equipped with a daylight movie projector, a portable power plant, and flip charts for audio-visual information dissemination. An average of 40 persons a day attend the meetings. (*A.G.A. Monthly*).

* * *

GET THAT DRYING LOAD

TURNING over the pages of a recent issue of *Gas Age* we were mistaken for the moment in thinking we had opened a fashionable journal for women. We were in fact looking at the coloured illustrations of an article entitled 'How to Sell Six Million Dryers in the Next Five Years.'

The author (Mr. Judson S. Sayre, General Manager, Bendix Home Appliances) worked on the theme that there is no excuse for a summer slump in gas dryer sales because sun fading is the most irritating and costly result of old fashioned line drying. He reinforced his arguments with a series of striking coloured photographs comparing sun-dried with Bendix-dried fabrics and materials.

For example, two identical pairs of handkerchiefs were used and washed 20 times, one pair being line-dried and the other Bendix-dried. The former showed severe sun-fading while the latter had retained their original colours. Even more dramatic was another experiment with a child's frock in which the sun-dried example, while still materially sound, had so faded as to be virtually finished. The other was almost as bright and fresh as the day it was bought. Similarly with a pair of rugs—save here the damage by fading was not so marked as the matted and hard-looking pile of the line-dried compared with the soft, fluffy and attractive appearance of the gas-dried. Finally, towels. A pile of half-a-dozen bath towels showed the Bendix-dried ones still fluffy and absorbent and the other pile (standing barely two thirds as high as the first) flat and harsh-looking.

We know that photographs can be faked (though we do not think these were); but even without the illustrations the author put up an irrefutable case for gas clothes-drying as a promising all-the-year-round load.

* * *

ANOTHER CUSTOMER SERVICE

AMERICAN businesses carry service to their customers a long way—and while we do not think it necessary, as a general rule, to include snow-melting as part of our customer service in this country, we quote it as an instance of what appears to be becoming common practice in the States.

The first concealed snow-melting system in Warren, Ohio, has been installed by the East Ohio Gas Company in front of its new office building. Embedded under the sidewalk is an automatically - activated system of wrought iron pipes. When the temperature outside drops below a certain point the system goes into action, circulating a heated solution of water and antifreeze to raise the temperature of the sidewalk and keep the surface free of snow and ice.

Another similar system runs under the driveway approach, keeping the street entrance open at all times. (*Gas Age*).

* * *

'TOP VUE' OVEN

AN entirely new innovation in domestic range design carries the above name. Marketed by the Detroit-Michigan Stove Co., this range is claimed to represent a revolutionary improvement over the old window-in-the-door type.

By touching a button to illuminate the interior of the oven, the cook can make an instant inspection of the contents through a glass panel let into the crown plate, without having to bend down or open the oven door. It should be explained that this type of range has a clear 'table-top' crown plate above the oven—the hotplate burners being positioned two on either side. (*Gas Age.*)

SERVICE CREW FIGHTS FIRE

THE Brooklyn Union Gas Company's customer service department showed its true colours on the Saturday morning early in April when a C-46 cargo plane crashed in Jamaica, New York.

Seconds after the crash the department, summoned by the police, sprang into action. Orders went out to special radio cars, the street section was notified, and in a matter of minutes men and vehicles converged on the scene of the blazing disaster. Moving like a well ordered combat team, the service men surveyed the damage and mapped a course of action. Fire was consuming two houses; two more were ablaze, and many more were in great danger.

Despite terrific heat, the men braved fire and falling timber to shut off the gas service. With the aid of firemen a hole was cut into the wall of the most seriously burning house and Brooklyn Union men were lowered into the basement to cut off the gas. Others canvassed the neighbourhood, checked gas supply and household equipment. Maintenance units stood by to cut off the street main should the need arise. Brooklyn Union played a great part in helping to avert what might have been an even greater tragedy. (*A.G.A. Monthly.*)

* * *

THE INVISIBLE WOMAN

THERE is a tendency in the States towards the dramatisation of cookery demonstrations by the introduction of some special feature or stunt to attract attention. The latest effort in this direction is reported from Pasadena, Calif., where the Southern California Gas Co. presented, with full theatrical technique, the 'invisible demonstrator.'

This remarkable effect was achieved by treating the demonstrator's cap, gloves, apron, and shoes, as well as the gas range and utensils, with luminous paint, and by using a 'black light' spotlight. The audience were thus treated to the rather unusual spectacle of disembodied hands floating around the stage with cooking utensils. Since one supposes the food, too, was invisible, as it could hardly have been treated also with luminous paint, one wonders whether the 9,000 strong audience were not diverted rather than instructed. Those who recall the macabre antics of the title rôle in the film, 'The Invisible Man,' will certainly appreciate this point.

Nevertheless, this 'biggest cooking school ever held in the United States' was acclaimed so successful that plans are now under way to stage similar shows in other cities. The same kind of demonstration was also carried out with a gas clothes dryer. (*A.G.A. Monthly.*)

D

Water Gas in Western Australia

THE Power-Gas Corporation, Ltd., has issued reprints of a paper on 'Carburetted Water Gas Manufacture from West Australian Sub-Bituminous Coal,' by R. P. Donnelly, M.INST.GAS E., M.INST.F., Fuel Technologist at the Western Australian Government Laboratories; F. J. Taylor, Engineer of the Fremantle Gas Company; and R. Broadbent, A.A.C.I., published in the *National Gas Bulletin* of July/August, 1951.

The authors state that there is no coal suitable for carbonisation in Western Australia. Supplies of gas-making coals have to be brought some 2,400 miles by sea from the Eastern coast of Australia. Supplies of this are never abundant and in 1949 a coal strike seriously interrupted them during the Australian winter months of June to September.

Sub-Bituminous Coal

At the Fremantle gasworks, a newly completed Power-Gas Corporation carburetted water gas plant was available for gas-making at the beginning of the strike and opportunity was taken to attempt to run it on West Australian sub-bituminous coal. Trouble free operation was achieved with gas production 85% of those achieved with coke and gas supplies from Fremantle were usually augmented. The plant continues to use the coal in regular commercial production and the larger gasworks at East Perth now uses coal in the same way.

A Power-Gas Corporation standard 500,000 cu.ft. per day, hand clinkered, automatically operated back-run plant has been operated on West Australian sub-bituminous coal for the past two years. The analysis of the coal is:

	%
H_2O	20.0
Ash	7.0
Volatile Matter	22.0
Fixed Carbon	51.0
C.V.	9,500 B.Th.U. per lb.

The coal has a dry ash free ultimate analysis of C 82.5, H 3.85, yielding in carbonisation assay 3.5% of tar and 20-25% of liquor. The output of the plant has been in the neighbourhood of 17,000-20,000 cu.ft./hr. (compared with 22,500 cu.ft./hr. from coke) of gas of a calorific value of 500-530 B.Th.U. per cu.ft. obtained by using 2-2.3 gal. of gas oil per 1,000 cu.ft. of finished gas.

The initial blue water gas calorific value lies between 260 and 290 B.Th.U. per cu.ft., the value being somewhat low because there is an appreciable percentage of blow gas in the blue water gas and also the conditions of operation of the plant give a cool firebed with a poor steam decomposition and high CO_2 (over 6.0%) in the blue water gas. This is brought about by the impossibility of blowing the plant sufficiently hard to get a hot firebed without overheating the carburettor and superheater above optimum oil cracking temperatures.

Fuel Consumption

This disability is experienced when using either coke or coal and is occasioned by the lack of a waste heat boiler on small plants to absorb surplus heat not required in the oil cracking vessels. A suggestion is made for overcoming this difficulty involving methods of boosting back run steaming on the plant. The fuel consumption on test is about 40 lb. of coal per 1,000 cu.ft. of 530 B.Th.U. C.W.G., compared with 35 lb. of coke for 511 B.Th.U. gas. Higher figures of about 50 lb. per 1,000 cu.ft. are obtained under operating conditions where no allowance is made for small coal screened out from deliveries or for coal used in stand-by times, which are 25% of the running time.

No difficulties are experienced with the fuel. Success with it is ascribed to the fact that the coal retains its hardness and lump form in the fire without disintegration. The passage of air and steam is, therefore, free and the fliers and unburnt fuel in ash losses are both low. The results with a coal of 1,600°C. ash fusion point are especially interesting, and the effect of fuel reactivity on the behaviour of the firebed is discussed.

Detailed accuracy is not claimed for the results, and it has not been possible to vary conditions sufficiently on the plant to investigate the effect of air/steam ratios because in the absence of a waste heat boiler the variation is too limited. The broad claim, however, to be able to run the plant commercially on a somewhat unorthodox type of fuel is substantiated if the coal is not too high in tar and volatile matter contents; thus, a coal with 27.0% of volatile matter could not be used satisfactorily. The cost of gas production appears to be little different from that with coke and is considerably less than the alternative method of gas production in Western Australia which is by carbonisation of imported New South Wales gas coal.

BOOK REVIEW

WHAT THE WORKER THINKS

THE eleventh and penultimate in the series of papers dealing with aspects of the nationalised industries, published by the Acton Society Trust, is entitled *The Worker's Point of View*. It is based on research carried out in a single coalfield by a single worker and its conclusions cannot, therefore, be regarded as representative of the whole industry. However, it is probably safe to assume that the major points of emphasis would be duplicated if further investigations were made in other coalfields, the differences being a matter of degree, rather than of a fundamental character.

The viewpoint of the coal worker is, of course, of interest—albeit indirect interest—to the gas industry. The important thing, surely, is to attempt to estimate to what extent the difficulties experienced by the worker in the coalfield are similar to those experienced by the worker in the gasworks. It is not unreasonable to suppose that there are certain basic ailments common to all nationalised industries. The underlying theme of this interesting booklet is the inadequacy of the channels through which information is passed from the Board—in this case the Coal Board—to the workers. The latter appear to be seriously uninformed about matters of importance and the Board does not seem to grasp what is, and what is not, relevant information. Much of the trouble, it is claimed, is due to failure on the part of members of consultative committees to pass on information which has been given them—a reservation which, as the booklet points out, raises the question whether management is entitled to think it has discharged its responsibilities when it has given information to these committees.

Particular criticism is levelled at the stiff and impersonal style in which information is given by the Board. One example given commences: 'The Board estimate that they will need to invest about £635 mill. in this great industry.' How much better, suggests the booklet, to say: '*We* shall have to spend £635 mill. on *our* great industry.' There is perhaps a moral here for the gas industry which seems to have no happy medium between equally aloof phraseology and the sometimes embarrassing familiarity of the gas board magazine.

The Worker's Point of View is obtainable from the Acton Society Trust, 39, Welbeck Street, London, W.1, price 2s.

A deputation from the Parliamentary and Scientific Committee waited upon Lord Woolton, the Lord President of the Council, to seek information and to make representations in regard to the Government's policy on industrial, etc., research and the means of effecting a closer liaison between science and industry. Among the recommendations were that those appointed to the scientific grades in the Civil Service should have at least as good prospects of pay and promotion to the highest grades as those in the administrative grades; and that urgent action be taken in regard to increasing facilities for circulating scientific information.

Steam in the Gas Industry

By L. J. CLARK, B.E.M., M.I.Mech.E., M.Inst.Gas E., A.M.Inst.C.E., A.M.I.E.E.,
North Thames Gas Board

From a paper to the 5th International Gas Conference, Brussels

STEAM demand does not fall in direct proportion to the gas made, as part-load running of prime movers and other machines is usually accompanied by lower efficiencies, and the major proportion of the steam distribution losses usually has to be maintained regardless of gas output. Although the total demand steam per therm of gas made on full load varies within limits of only ±12% for the widely differing types and sizes of works in the area of the North Thames Gas Board with outputs exceeding 5 mill. cu.ft. per day, the costs of steam and power, excluding capital charges, vary over the much wider range of ±60% and this is equivalent to a variation of 2½% to 10% of the total direct costs of gas making.

These differences arise from:—

(*a*) The various types of carbonising plants installed and the extent to which available waste heat is recovered;

(*b*) the extent to which relatively low priced coke breeze is used as a boiler fuel, in place of coke or liquid fuel, for supplementing the waste heat steam; and

(*c*) the size of the works and the extent to which the power system has been modernised.

In the case of the works with the lowest proportional power costs—*i.e.*, 2½% of the total cost of gas production—the carbonising plant consists of one large continuous vertical retort house of 8 mill. cu.ft. per day capacity, and although the fuel consumption of this plant is the lowest in the Board's area, and equivalent to less than 10% of the coal carbonised, it provides sufficient waste heat steam to supply about 75% of the total demand of the works, including power generation.

The works equipped with static carbonising plants provide a substantially smaller proportion of waste heat steam, and in the case of coke oven plants it is impracticable to recover any waste heat steam from the flue gases, due to the efficient system of heat regeneration employed, and to the loss of sensible heat in the producer gas by wet cleaning. For all such works, larger amounts of supplementary direct-fired steam are required, and it is in these boilers that every endeavour should be made to consume efficiently the cheaper and lower grade fuels such as coke breeze.

Load Factor Studies

Several studies have been made of the load factor and characteristics of the gas demand in particular districts, and it is of interest to examine the gasworks steam loads on a similar basis.

Dr. Burns[1] has shown that the daily gas load in the North Thames Gas Board's area for the 365 days of a year of average or standard temperatures follows the dotted curve shown in Fig. 1, the demand on the peak day being expressed as 100% load for convenience. He also showed that the most economic division of the load between coal gas and carburetted water gas for a large inter-linked system of works was made by the chain-dotted curve, the shaded area representing the proportion of carburetted water gas.

As the steam load is related to the gas load, it follows that the curve for the mean daily steam demand for 365 days of an average year will be similar in form to the gas load curve, although it will not diminish proportionately with the gas load, due to lower efficiency of steam utilisation at part load.

By applying the average steam consumption figures for the works of the North Thames Gas Board, the upper total steam consumption curve is derived. This curve is also plotted on an initial basis of 100% demand on the peak day, but, due to the additional heavy demand amounting to some 10% of the total, imposed by the anti-freezing apparatus, it has been necessary to super-impose this short term of peak load for the period when the temperature is below 32°F., and the peak day's steam demand is, therefore, raised to 110%. Steam is a convenient medium for preventing freezing of gasholder cups and the multiplicity of liquid seals, lutes, tanks, and services on the works, but the additional strain imposed on the boiler plant is substantial.

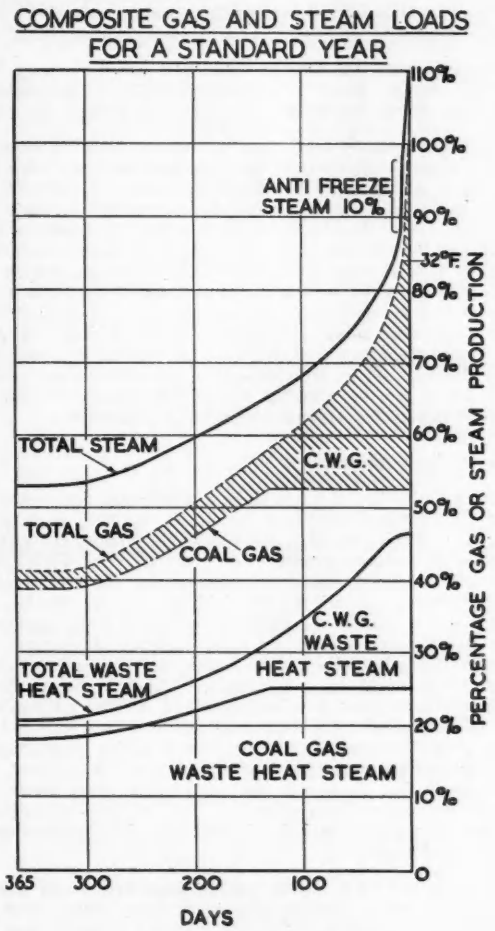


FIG. 1.

The load factor of the gas demand shown in Fig. 1 is 55%, and that for the total steam demand is 60%. It is appreciated, however, that in practice the hourly steam load factor is further reduced by variations of steam demand within the day, and when this is included the resulting load factor works out at 45% to 50%, which figures are similar to the load factor for electricity supplies on the works. It is also of interest to subdivide the total steam load into its components as supplied from waste heat boilers on the carbonising and carburetted water gas plants, and from fuel-fired boilers. These

divisions are indicated by the lower curves, which have been determined on the basis of the plants actually installed in the North Thames Gas Board's area, and on the assumption that they are selected to operate for periods commensurate with their efficiency—*i.e.*, that the least efficient horizontal retorts and carburetted water gas sets without waste heat recovery are operated for the minimum periods within their respective load allocations. The plant capacities are made up as follows:—

Coal Gas

31% of total capacity in continuous vertical retorts.
10% of total capacity in intermittent vertical chambers.
33% of total capacity in horizontal retorts without waste heat boilers.
13% of total capacity in horizontal retorts without waste heat boilers.
13% of total capacity in coke ovens.

Carburetted Water Gas and Oil Gasification Plants

47% of total capacity with full waste heat recovery.
27% of total capacity with waste heat boilers only.
4% of total capacity with generator boilers only.
22% of total capacity without any waste heat recovery.

On this basis, the average waste heat steam recovery from all the coal gas plants is determined at 8.2 lb. per therm of gas, and 8.8 lb. per therm from carburetted water gas plants.

It is of interest to note from the steam curves that the quantity of direct-fired steam required to supplement the waste heat supply is substantially constant for about 300 days of the year, and then rises rapidly during the remaining 65 days to a peak of nearly double the average value. It is also evident that if all the coal gas were manufactured in continuous vertical retorts with a waste heat steam production of 13.6 lb. per therm of gas made, instead of the average for the Board's area of only 8.2 lb., the amount of supplementary direct-fired steam would be quite small, and further, if the efficiency of steam utilisation were improved to reduce the demand by about 20%, the plants would be self-sufficient in waste heat steam. Such a position can be achieved by complete modernisation and co-ordination of the steam and electricity services.

Close Agreement

An examination of the total daily steam loads and production for the combined works of the Board, in 1950, is shown in Fig. 2, and this reveals a reasonably close agreement with the theoretical curves, although the actual direct-fired steam demand showed a greater variation during the year than the corresponding theoretical load. This arises from the fact that there was a general shortage of gas-making plant capacity in the Board's area, due to the rapid expansion in business and the arrears of repairs and new plant construction caused by the second world war. Consequently, it was not possible to balance the proportion of coal gas and carburetted water gas in accordance with the ideal relationship shown in Fig. 1. It was generally necessary to maintain a higher proportion of carburetted water gas plant at work during the summer, with the result that there was less variation in total waste heat steam production from summer to winter, and, consequently, there was a greater variation in the demand for supplementary direct-fired steam.

The overall load factors of the combined steam demand (excluding anti-freezing steam), agree fairly closely with the theoretical and actual curves, but it should be made clear that the winter of 1950-51 was very mild and the anti-freezing measures were not necessary, so that the 10% superimposed peak did not arise.

The provision of adequate boiler capacity, which would be capable of supplying the additional demand imposed by the anti-freezing apparatus, has a serious effect upon the capital charges for the steam-raising plant as the load factor associated with frost precautions is extremely low.

Various methods can be adopted to reduce these heavy capital charges, such as the use of simple and cheap oil-fired boilers for supplying the peak load, but a much more attractive method is available by shutting down the benzole plant during periods of frost. The steam load associated with a normal benzole plant is equivalent to about 70% of the anti-frost load, so that the major portion of the idle boiler capacity can be avoided, and, further, it permits a useful increase in gaseous thermal output from the works, which with a corresponding quantity of producer gas diluent to give benzolised producer gas at the declared calorific value of 500 B.Th.U. per cu.ft., is equivalent to nearly 10% of the coal gas made. The economics of this method of supplementing the gas output at times of severe peak loads, as compared with carburetted water gas, shows a considerable financial advantage in favour of benzolised producer gas, and it is slightly cheaper than peak-load oil gas.

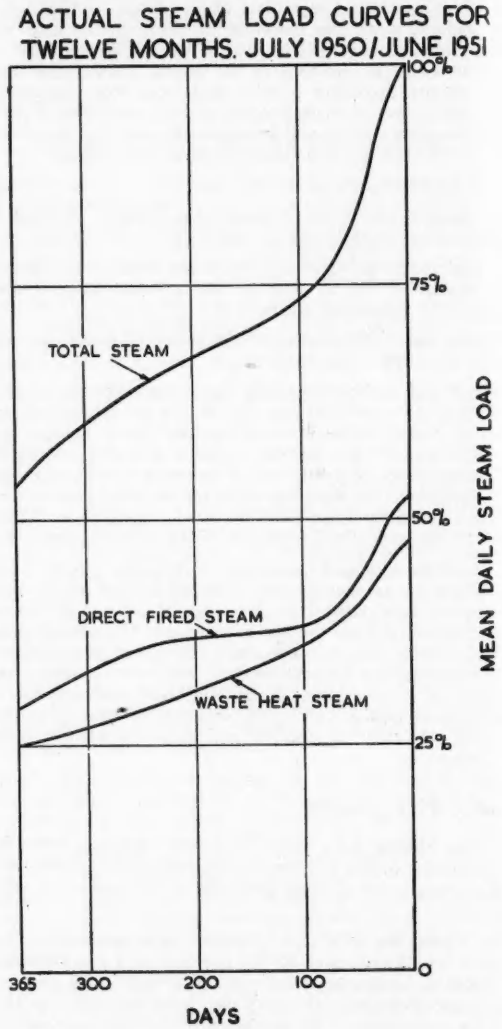


FIG. 2.

Waste Heat Recovery

It is unlikely that any other industry offers such scope for waste heat recovery as the gas industry. In the principal manufacturing processes, large quantities of sensible heat are available at temperatures ranging from 500° to 1,000°C., and this heat can be recovered from both the products of reaction from the carbonising and gasification processes and the products of combustion from the heating fuel. The first consideration for efficient recovery is to return as much heat as possible to the manufacturing process by recuperation, regen-

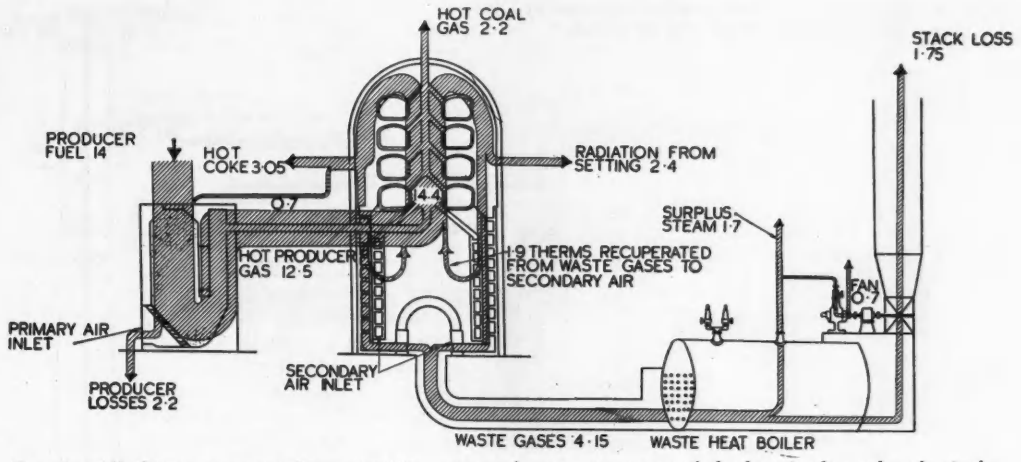


FIG. 3.—*All figures represent heat quantities expressed as a percentage of the heat in the coal carbonised.*

eration, or other means, but when this has been done there is still a large surplus, and, if all this unreturnable waste-heat in the British gas industry were effectively utilised, the equivalent amount of fuel saved would be nearly 500,000 tons per annum.

Various types of plant have been developed for recovering the surplus heat, which in the past has been used mainly for steam raising and water heating.

The fuel requirements of the four main systems of carbonisation were examined by Pexton[2] and their respective heat balances are shown diagrammatically in Figures 3, 4, 5 and 6, and the values given represent heat quantities expressed as a percentage of the heat in the coal carbonised. The diagrams show that while the largest producer of waste heat steam is the non-recuperative continuous vertical retort, it also has a very low total fuel consumption. The coke oven, however, produces only a small amount of waste heat steam from the jacket boilers of the mechanical producers.

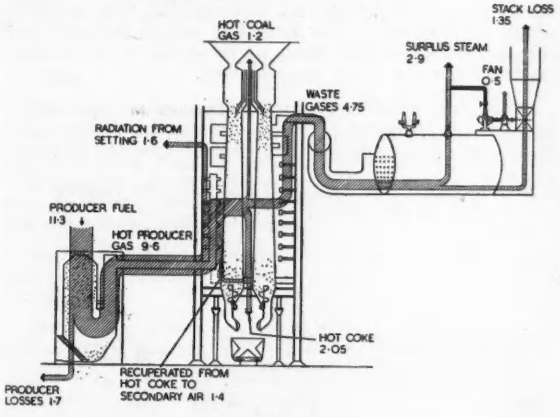


FIG. 4.

The heat balances for carburetted and blue water gas plants are shown diagrammatically in Figures 7 and 8, and in these cases the heat quantities are expressed as a percentage of the total fuel input—*i.e.*, coke and oil—to the plants.

The steam production from the various processes is summarised in Table I, the units being expressed as pounds of steam raised (from and at 212°F.) per therm of gas made.

It will be noted that, in the case of mechanical producers, the quantity of steam raised may vary considerably according to the design of the jacket boiler. With one design, which incorporates two annular jackets connected by short water tubes, the hot producer gas is conveyed down the outside of the lower jacket, thereby releasing much more of its sensible heat. In certain continental plants, where the high price of fuel justifies greater capital expenditure, a fire-tube type of boiler has been satisfactorily used for recovering the sensible heat from producer gas, and in this case a total steam production of 20 lb. per therm of gas made has been obtained.

TABLE I

Type of gas	Type of plant	Steam raised lb. per therm of gas
Coal gas	Continuous vertical retorts	13.6
	Intermittent vertical chambers	6.1
	Horizontal retorts	10.0
	Dry coke cooling on coke ovens and I.V.C.'s	8.0
Carburetted water gas (500 B.Th.U.)	Self clinkering plant { Generator jackets	5.6
	Self clinkering plant { Waste heat boiler	8.0
		13.6
Blue water gas	Self clinkering plant { Generator jackets	10.8
	Self clinkering plant { Waste heat boiler	15.0
		25.8
Producer gas	Mechanical producer jackets	4 to 10

When waste heat recovery was first applied to the carbonising process, boilers of the water-tube type were employed for the purpose. It was soon found, however, that with low-

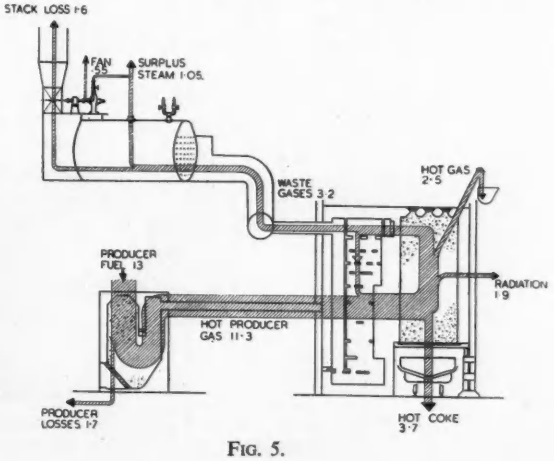
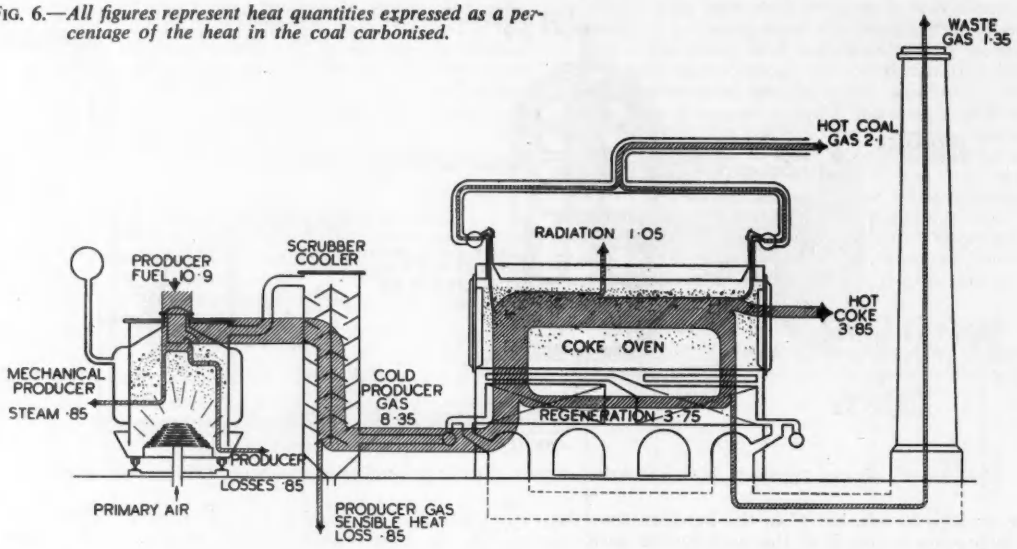


FIG. 5.

FIG. 6.—*All figures represent heat quantities expressed as a percentage of the heat in the coal carbonised.*



grade heat and a negligible proportion of radiation, higher rates of heat transmission and generally more satisfactory results could be obtained from cylindrical smoke-tube boilers with straight or sinuous tubes of about 2 in. dia., and boilers of this type are now used almost exclusively in the gas industry.

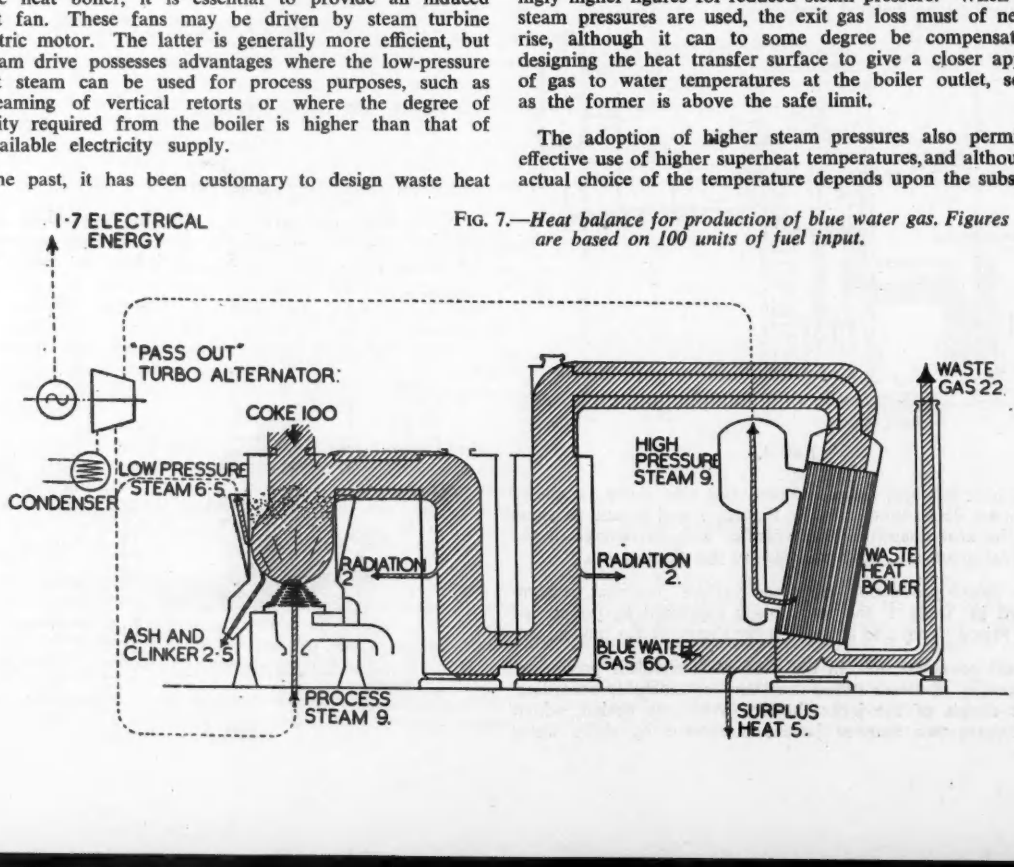
Several papers[3] have been written on the design and application of waste heat boilers, and the published test results indicate that a boiler efficiency of about 75% may be expected when the waste gas inlet temperature is in the region of 850° to 900° C., and this may be reduced to about 60% if the waste gas temperature is lowered to 500°-550° C. As a considerable pressure loss occurs through the tubes of a waste heat boiler, it is essential to provide an induced draught fan. These fans may be driven by steam turbine or electric motor. The latter is generally more efficient, but the steam drive possesses advantages where the low-pressure exhaust steam can be used for process purposes, such as the steaming of vertical retorts or where the degree of reliability required from the boiler is higher than that of the available electricity supply.

In the past, it has been customary to design waste heat boilers for relatively low pressures, ranging from 120 to 160 lb. per sq. in., but at the present day there is a trend to use higher pressures up to 300 lb. per sq. in., which is the practical limit imposed by the design of the shell-type boiler.

It is appreciated that, by raising the operating pressure of a waste heat boiler, the waste gas loss at the boiler exit will also rise if the differential temperature between the gas and the water at boiler exit be maintained. In practice, however, the minimum gas exit temperature from the boiler is usually set at 450° F., in order to avoid the danger of corrosive condensate forming in the induced draught fan and ducting. This limits the approach between water and gas temperatures to 80° F. at 160 lb. per sq. in., and correspondingly higher figures for reduced steam pressure. When higher steam pressures are used, the exit gas loss must of necessity rise, although it can to some degree be compensated by designing the heat transfer surface to give a closer approach of gas to water temperatures at the boiler outlet, so long as the former is above the safe limit.

The adoption of higher steam pressures also permits the effective use of higher superheat temperatures, and although the actual choice of the temperature depends upon the subsequent

FIG. 7.—*Heat balance for production of blue water gas. Figures are based on 100 units of fuel input.*



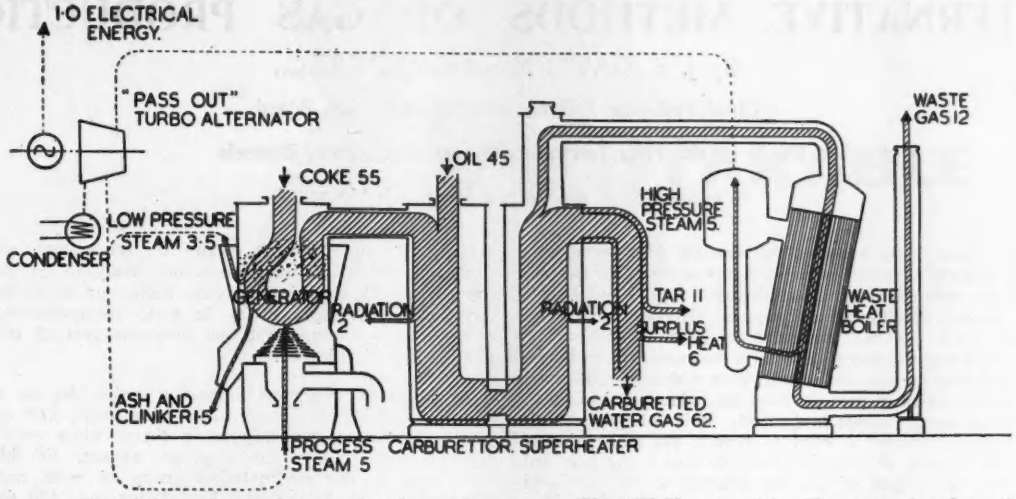


FIG. 8.—*Heat balance for production of carburetted water gas (500 B.Th.U. per cu.ft.). Figures are based on 100 units of fuel input.*

use of the steam, and whether it is expanded in an engine or turbine to a back pressure or a vacuum, the greater potential heat in the steam resulting from the higher pressure more than offsets the higher exit gas loss.

As an example, it may be shown that steam produced from a boiler at 300 lb. per sq. in. and 550° F. will give 33% more power when expanded in a back pressure turbine to 20 lb. per sq. in., than a corresponding installation raising saturated steam at 160 lb. per sq. in.

The sensible heat of the incandescent coke discharged from static carbonising plants provides a useful source for waste heat recovery by raising steam, and, although there are only a few installations of this type at work in Great Britain, their economic advantages have been justified by the operating experience. It is only practical to apply the dry coke cooling system to the plants carbonising large charges, such as coke ovens and intermittent vertical chambers, as the difficulties of handling the numerous small charges from horizontal retorts are considerable.

There are two main systems employed in dry cooling:

(*a*) The bunker type, in which the coke is cooled in a large refractory lined chamber holding several charges. The inert cooling gases are circulated through the coke and thence to a steam boiler, returning to the cooling chamber by way of a fan and a closed circuit to ducting.

(*b*) The chamber type, comprising one or more cooling units into each of which a container holding one coke charge is placed.

With either of these systems, boilers of the water-tube or fire-tube types can be employed.

The coke is usually cooled through a temperature range from 950°/1,000°C. to 250°/300°C., and about 60% of its initial sensible heat is recovered as useful steam. Approximately 800 lb. of steam is raised per ton of coke cooled, and this is equivalent to 8 lb. of steam per therm of gas made.

Although the capital cost of dry coke cooling units is about twice that of a normal stoker-fired boiler plant of similar steam-raising capacity, they provide a considerable economic advantage, and the overall cost of steam is about 55% that from stoker-fired boilers based on 80% load factor.

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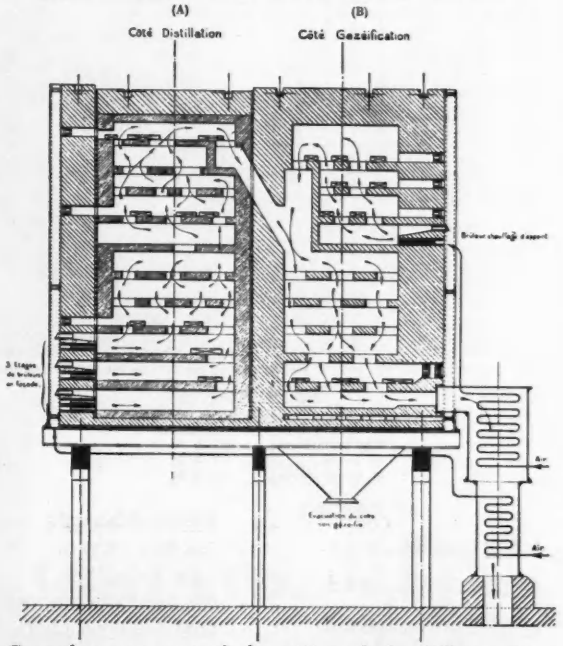
ZINC RESTRICTIONS REMOVED

THE Ministry of Supply and the Board of Trade have announced that because of improvement in supplies of zinc, restrictions on uses of that metal are to be removed. The Copper and Zinc Prohibitive Uses Orders, which prohibit the use of zinc, copper, and alloys such as brass in a large number of manufactured articles, will be amended so that the control will apply in future only to copper and copper-based alloys. The amendments will come into effect shortly. (The Orders concerned are SI Nos. 275, 277, 1815, and 1960 of 1951, and No. 123 of 1952.) The administrative arrangements which restrict the uses of zinc for galvanising iron and sheet steel, wire, wire products, and tubes, were removed with effect from August 14. Licences will still be necessary to acquire virgin zinc, but the allocation system will be discontinued.

THE GILLY RETORTS AT LIMOGES



General arrangement of the setting of the Gilly retorts at Limoges, referred to in our editorial comment on earlier pages.

ALTERNATIVE METHODS OF GAS PRODUCTION

By J. E. DAVIS, M.Inst.Gas E., F.R.I.C.,

Chief Technical Officer, South Eastern Gas Board

Paper at the Fifth International Gas Conference, Brussels

(*Continued from page 481 of last week's* 'JOURNAL.')

As the load factor becomes less than 240 days per annum, the process with the lower plant cost scores at the expense of that with the lower materials cost. Figs. 3 and 4 show an appropriate distribution of plant at riverside works and at inland works for this particular set of circumstances. It will be noted that the necessity to carry out repairs to carbonising plant during the summer months gives a seasonal reduction in gas output which in part provides the reduction required to follow the seasonal change in demand. It is not quite sufficient and there remains a need to reduce gas makes below the normal capacity of plant for about 80 days in the year and to restrict the output of gas by diluting to the declared calorific value by means of producer gas rather than blue water gas. But the amounts of carburetting required in the whole of the year is very small unless peak periods are encountered. At the inland works the most economic proportion of carbonising plant to be installed is much lower, and carburetted water gas forms a substantial proportion of the make right through the year, even though no peak periods are encountered.

These two solutions of the problem for the two cases instanced would be satisfactory as regards both economy and convenience if it were not for the certainty that at some times during some winters heavy peak periods will be encountered. The single line curve shows that the plant required to cover the difference between 1.25 times the mean and 1.60 times the mean—*i.e.*, the output we have designated as 'peak output'—is not likely to be used for more than 30 days in a severe winter or more than six days in the average year. In these circumstances, plant cost becomes all-important and materials cost of comparatively small significance.

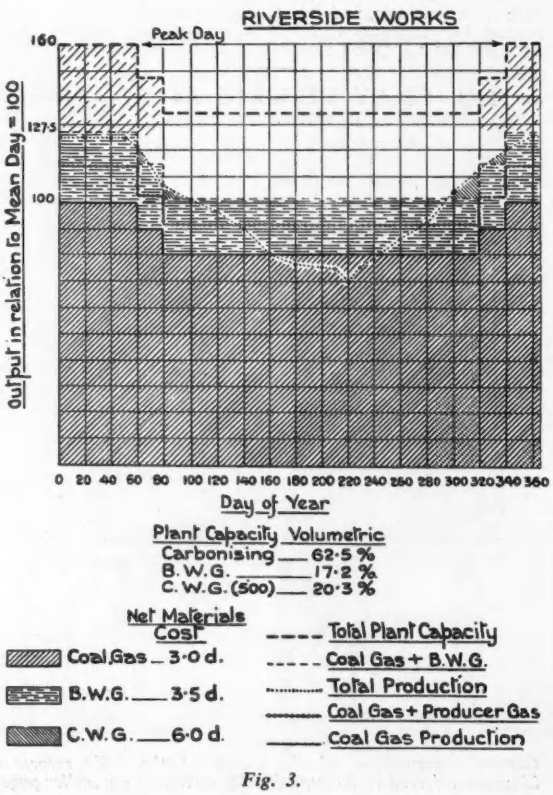

RIVERSIDE WORKS
Peak Day
160
127·5
100
Output in relation to Mean Day = 100
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Day of Year
Plant Capacity Volumetric
Carbonising — 62·5 %
B.W.G. — 17·2 %
C.W.G. (500) — 20·3 %
Net Materials Cost
Coal Gas — 3·0 d.
B.W.G. — 3·5 d.
C.W.G. — 6·0 d.
Total Plant Capacity
Coal Gas + B.W.G.
Total Production
Coal Gas + Producer Gas
Coal Gas Production

Fig. 3.

To illustrate this most important point, let us assume that an orthodox type of carbonising plant can produce gas at an overall cost of 10d. a therm when working on a mean load factor of 240 days per annum. Of this 10d., 3.5d. may be the net materials group of costs and 4.5d. the plant costs. At half this load factor—*i.e.*, 120 days per annum—the materials cost will be unaltered, but the plant costs will be doubled and the overall cost will now be 14.5d. per therm. With the usage of 30 days per annum —*i.e.*, at the usage to be expected of peak load plant in a severe winter—the plant units will be further multiplied four times, which means that they alone will amount to 36d. a therm and the total cost of this gas will be 41.5d. But we cannot credit this peak load plant with the performance we get from it in the exceptional winter. Rather must we take its cost for the average winter when it works for only six days, and the plant costs now fall to be multiplied five times more. Then the cost of this gas per therm is 185.5d., of which 180d. represents plant costs. Certainly one would not choose carbonising plant for this duty, but the case with water gas is little better and the argument shows why there has been, and continues to be, so urgent a search for gas manufacturing processes which shall have a very low plant cost, even though the raw materials they use may be expensive and gasified at something less than the maximum possible efficiency.

Seeing that the total quantity of gas required to meet the peak loads is small in relation to the total quantity manufactured over the whole year, it seems not unreasonable first to enquire whether an extension of storage could not meet the situation. F. M. Birks[4] has shown that the use of conventional forms of storage in gasholders becomes impossibly costly if those holders have to provide for storage of more than one day's output over and above the normal storage required to smooth out hourly and daily fluctuations. The amount of gas required to cover the peak period of a severe winter over and above the output of plant rated at 1.25 times the mean day may be as much as five days' make, so that the question of storage by orthodox means is out of the question.

Haselden and Reis[5] have considered with careful detail a system by which methane would be separated from coal gas during periods of low load and liquefied for storage against the period of peak demand. The estimated costs of peak load gas made at leisure and stored in this way look attractive compared with the costs of gas made by any process if the plant for making this gas is installed for peak loads and peak loads only. But gas-making plant can be used at any time when it is desired to do so, whereas the highly specialised plant required for methane separation and storage would have one use, and one use alone—namely, to meet a short-lived peak. At the present time, when demands for gas are growing more quickly than it is possible to obtain new gas-making plant, it is unlikely that steel and capital would best be employed on a project

(*Continued on p. 527*)

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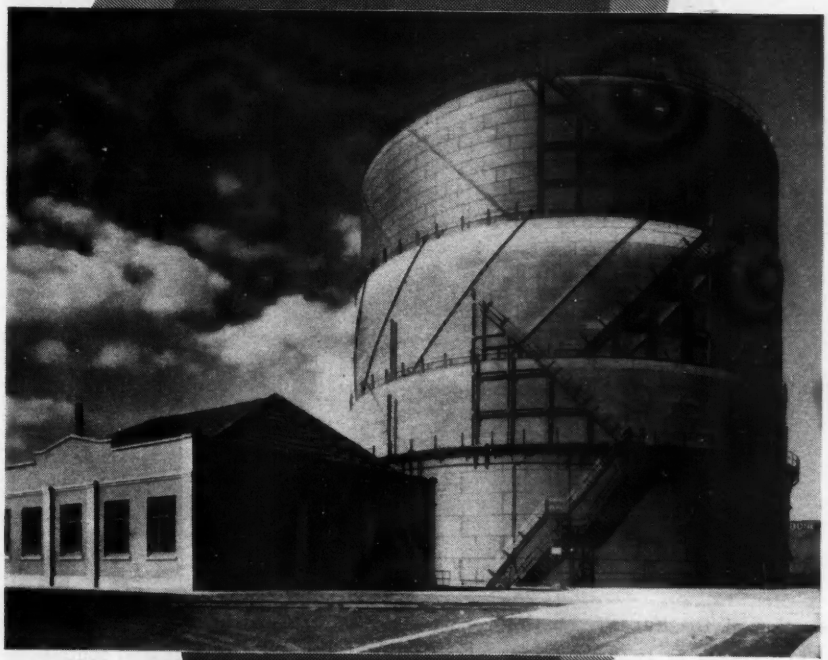

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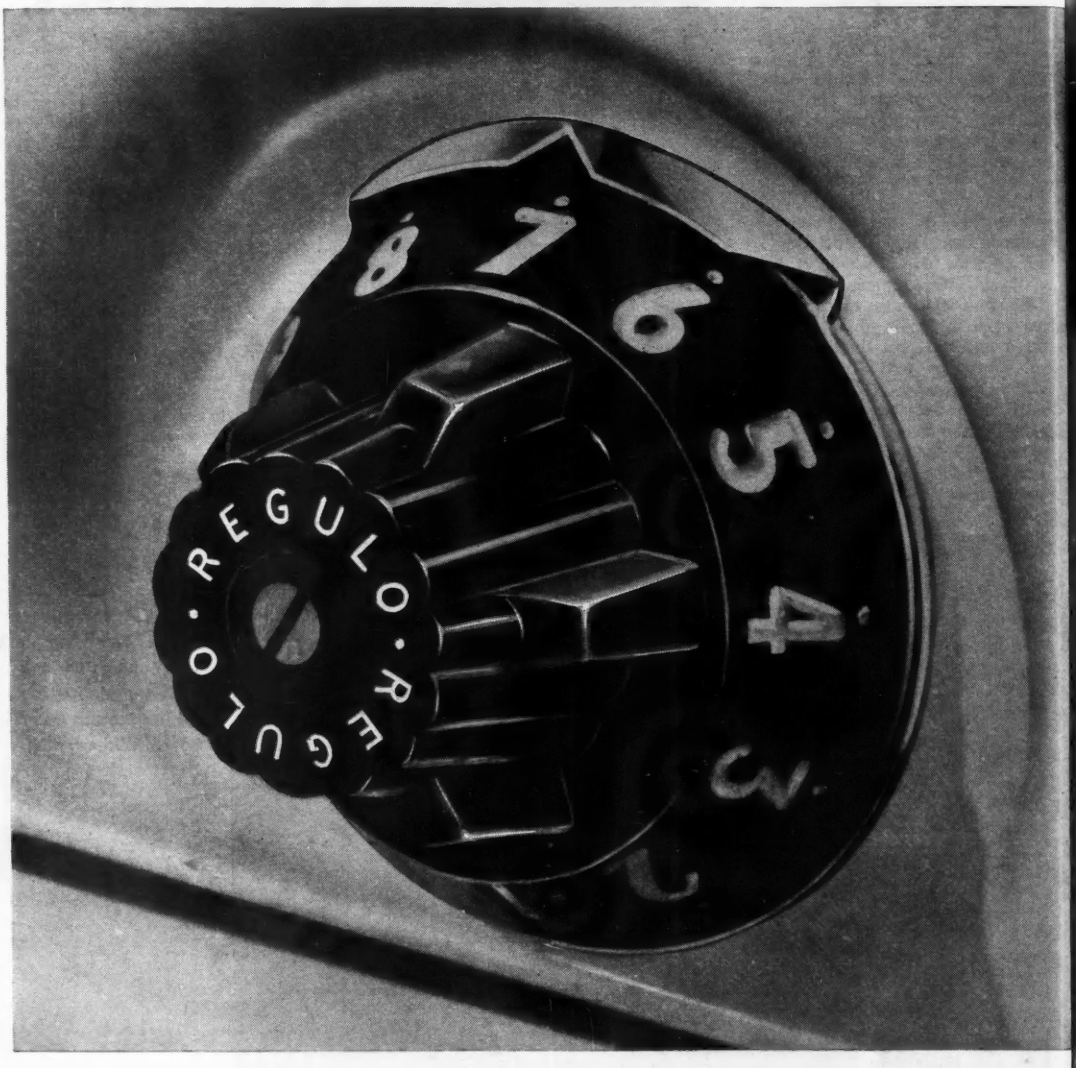

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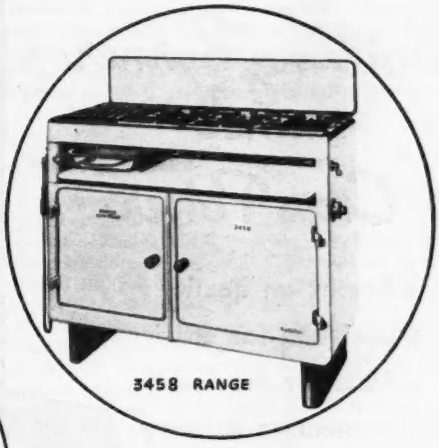

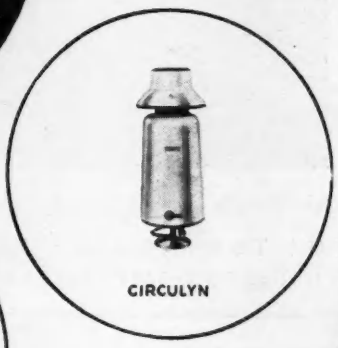

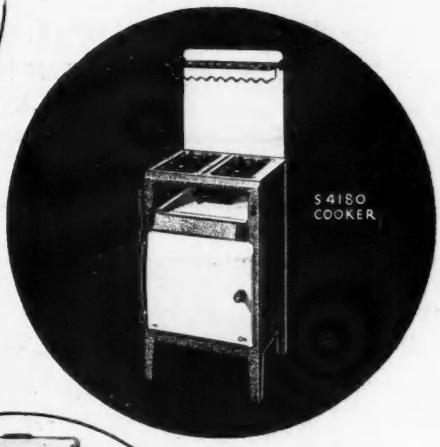

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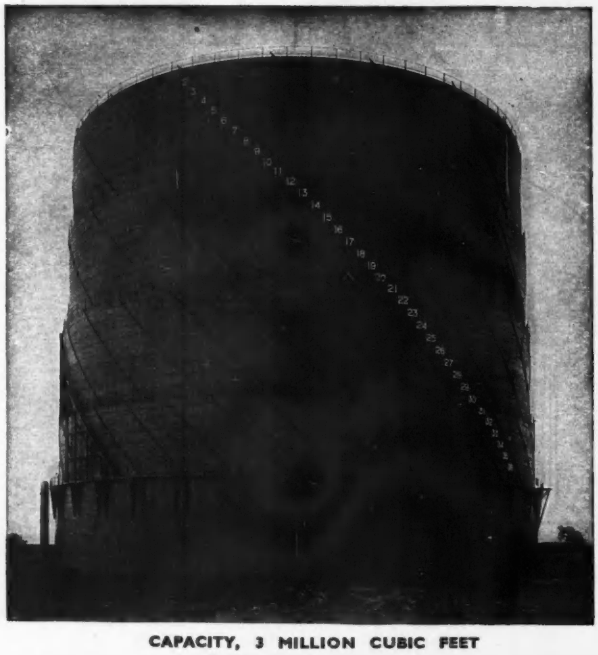

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such as that which Haselden and Reis describe, but storage of thermal energy in this convenient form may well be found an appropriate method of meeting peak loads where gas is received at the end of a long pipeline.

A more promising method of providing a large, though not unlimited, storage to meet peak requirements involves the use of liquefied petroleum gases, mainly propane and butane, for release during the period of peak demand[6]. A project such as this gives rise to the difficulty that the gases are not normally made by the gasworks, but must be

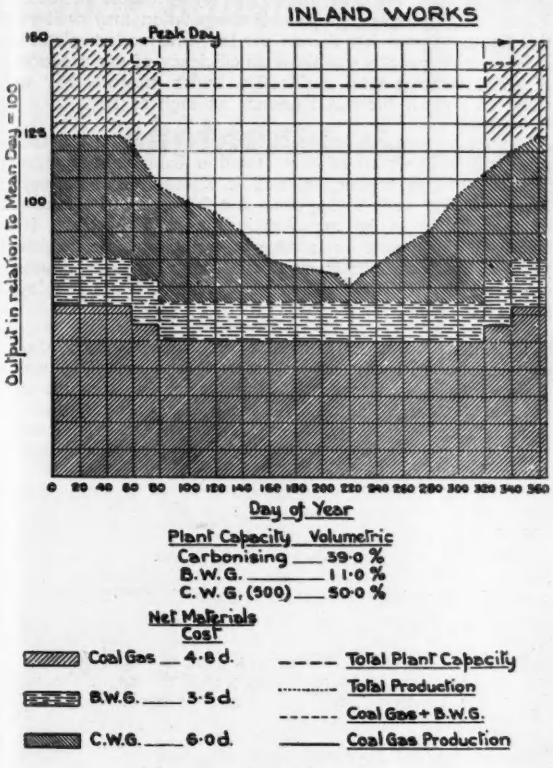
INLAND WORKS
Peak Day
Output in relation to Mean Day = 100
160
125
100
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360
Day of Year
Plant Capacity Volumetric
Carbonising — 39·0 %
B.W.G. — 11·0 %
C.W.G. (500) — 50·0 %
Net Materials Cost
Coal Gas — 4·8 d.
B.W.G. — 3·5 d.
C.W.G. — 6·0 d.
Total Plant Capacity
Total Production
Coal Gas + B.W.G.
Coal Gas Production

Fig. 4.

purchased from oil refineries. They would need to be in stock at the beginning of every winter. If the winter were a mild one, they would not be used. If it were severe, the tanks would be emptied and would need to be replenished as soon as the cold spell was over, and unless the gas undertaking had a regular use for these gases this practice would result only in passing the problem of meeting peak demands on to the oil refineries.

It would seem, therefore, that while methods of storing gas in liquid form may have a part to play in special circumstances they are unlikely to yield a general solution, and the search must continue for gas-producing processes of low plant cost. It is quite obvious that no such process would fulfil the requirements of low capital cost, if the raw material were supplied as coal or coke, because the handling plant for these solid fuels would alone cost more than can be allowed. Liquid hydrocarbons are the obvious raw materials. In terms of ultimate chemical composition, the essential difference between liquid hydrocarbons and gaseous hydrocarbons is in the carbon/hydrogen ratio, and the aim of the gasification process must be to increase the relative proportion of hydrogen either by removing carbon or by adding hydrogen, preferably by doing both—for example, by using some of the surplus carbon to produce hydrogen. This is the objective of the catalytic gasification process of Stanier and McKean[7] and now in course of development from the pilot plant to commercial unit. If this can be achieved with the degree of success which preliminary experiments have suggested should be possible, it will have fulfilled the defined objectives. It is by no means the first attempt to use liquid hydrocarbons in cheap and simple plant for the production of town gas. The process described by MacCormac[8] has now been in operation as a peak load gas-producing source for several years. It meets the requirements of low capital cost and simple operation, suffering only from the drawback that it fails to correct the carbon/hydrogen ratio and indeed consumes much of the hydrogen present in the original oil, giving rise to a gas of inconveniently high specific gravity.

Thermal Cracking Process

These two processes, one effecting hydrolytic cracking and the other controlled oxidation, differ from the majority of oil gasification processes which produce gas almost wholly by thermal decomposition of the oil. Typical of the thermal cracking process are the Hall[9] high B.Th.U. process, and the Semet-Solvay[10] process, both of which are finding favour in the U.S.A. for meeting peak demands and, in the expressive American term, for 'peak shaving.' They do not give a high thermal yield of gas per gallon of oil, though this is of less consequence where oil is cheap, and they produce a gas with a calorific value of about 1,000 B.Th.U. per cu.ft. being thus admirably suited to a district where the normal supply is natural gas.

A rich hydrocarbon gas of this calorific value has been considered too greatly different in composition from normal town gas for use in Great Britain and the process of Leon B. Jones[11] which operates at a temperature sufficiently high to decompose a proportion of the hydrocarbons, thus giving rise to gas high in hydrogen and having a calorific value and specific gravity not too different from that of normal coal gas, has found a limited use. But such a drastic cracking necessarily decreases the thermal efficiency. While it is desirable that a peak load process should be capable of producing a gas having a calorific value and specific gravity and combustion characteristics as close as possible to those of the normal production, this is not absolutely necessary. The normal programme of plant operation to meet seasonal variation in loads unavoidably produces a higher proportion of carburetted water gas during the winter months than in the summer months, with a consequent increase in the specific gravity of the gas. Modern gas appliances possess a reasonably high tolerance to variations in gas quality, but an increase in specific gravity at the same calorific value must mean a reduced thermal input to such appliances and this reduction is most likely to occur when the demands for heat are greatest. It would be in the interests of good service to arrange that at these times, when a high specific gravity is inevitable, a calorific value somewhat in excess of the normal should be supplied in order that the Wobbe Number (which is an index of the thermal discharge) may be controlled within reasonable limits. In such circumstances a peak load gas having a calorific value higher than that of the normal supply would be valuable not only in increasing the total gas available, but also in correcting the effects of high specific gravity.

Earlier in this paper it has been seen that, apart from a general shortage of coal of all kinds, there is a particular shortage of those kinds of coal which are by tradition regarded as gas coals. It is natural that an industry concerned mainly with the manufacture of gas should have selected, when selection was possible, those kinds of coal which, on carbonisation, gave the greatest yield of the richest gas—the so-called 'fat' coals. It is these which have become depleted. The varieties of coal capable of being carbonised successfully are far wider than the kinds normally classed as gas coals. In Great Britain, at least 50% of all the coal mined can be carbonised to yield gas and sound coke. By blending with these coals a proportion of others which would not alone yield a sound coke, the proportion which could be subjected to carbonisation is capable of substantial increase. But in departing from the customary kinds of coal it is important to

note that the yield of gas, and particularly of hydrocarbon gases, is likely to fall and the yield of coke per ton to increase. This must be regarded as the tendency for change in the nature of the coal substance available in the future, but the form in which the coal substance is obtained also calls for consideration.

We have seen that traditional methods of obtaining raw materials, in so far as they involve hard manual effort, are unlikely to produce these raw materials in the quantities needed. Changes in the direction of providing machinery to reduce the manual effort required must take place if the raw material is to be obtained. The tendency, already becoming apparent, will be for mechanical methods to produce smaller and dirtier coal. Smaller coal is not likely in itself to be any disadvantage in most carbonising systems, although it is not the generally approved type for continuous vertical retorts, but dirty coal is a severe handicap because of the freight charges on the useless ash, carbonising capacity occupied by this same ash, and the increased ash content of the coke which must be sold. Coal cleaning appears the obvious answer, but this fine coal will require treatment by wet processes and the residual water is not readily removed. If carbonising plant has to deal with wet fine coal, its capacity may be substantially reduced. We see, therefore, the likelihood that the gas-making capacity of carbonising plant may become seriously reduced both because the coal substance itself contains less gas than formerly and because this coal substance may be diluted either with ash or with water. If for a given output of gas more coal has to be carbonised, more plant and more labour will be needed and manufacturing costs increase.

Merits of Coke

To offset this unfortunate sequence, it may so happen that the merits of coke as a smokeless fuel, possessing in the domestic market the ability to give a substantially enhanced thermal efficiency in use, become recognised as justifying a premium price relative to coal. If this should happen, the increased costs associated with changes in coal quality may well be cancelled, but there can be no assurance that the premium price will be obtained; nor does past experience lead one to hope too much in that direction. Indeed, such a happening would be contrary to the present tendency to seek, and to be willing to pay, a premium for, automatic service; nor can it be forgotten that the cost of meeting peak periods in solid fuel demand has yet to be assessed accurately.

If it should not materialise, the manufacturer of gas, failing to obtain as much as formerly from each ton processed, would be faced with the necessity of producing more gas from the increasing yield of coke, and in doing so he would have two options—either to adopt a lower calorific value for gas supplied, a course which would increase storage and distribution costs and reduce the output value of his water gas plant (because the daily thermal output of such plant is highest at the higher calorific values) or to use a higher proportion of oil, so increasing his net materials cost. There is at present one important option lacking—namely, the ability to convert coal to gas directly, irrespective of its caking properties or its ash content, and to produce from that coal a proportion of hydrocarbon gases adequate for enrichment of the whole existing standards of calorific value or even higher. It is the absence of this option and the promise that the difficulty may be remedied which causes so much interest to be attached to the work of Dent and his collaborators.

Dent and Hebden[12] have shown that the process difficulties hitherto associated with the catalytic synthesis of methane from carbon monoxide and hydrogen can now be overcome and that methane produced in this manner may be an economic alternative to the production of hydrocarbon gas from petroleum. Such a means of obtaining an enhanced yield of hydrocarbons from the coal substance itself would avoid the necessity of manufacturing and distributing gas of lower calorific value or of employing more petroleum, but it still represents a somewhat unattractive series of operations upon the coal substance, comprising carbonisation of the coal, gasification of the coke to blue water gas, purifying that blue water gas to an extremely low sulphur content, synthesising methane from the purified blue water gas, and finally removing from that gas the carbon dioxide produced during synthesis.

A more attractive future possibility is that the work of Dent[13] based upon his observation of the high yield of hydrocarbon gases which can be obtained when coal is treated with hydrogen under pressure. A good British gas-making coal may show on carbonisation a Hydrocarbon Enrichment Value of 35 therms per ton. Hydrogenation may well raise this figure to over 100 therms per ton. In modern plant, the carbonisation process can show an efficiency of gas production of 60%, whereas total gasification under pressure may well show an overall thermal efficiency as high as 80%.

It may be contended that discussion of hypothetical future processes is likely to distract attention from existing proved methods of gas production, and it would indeed be unfortunate if that were to happen. Bearing in mind the nature of the change to be expected in the coal substance, it is clearly of the utmost importance to ensure that the maximum yield of hydrocarbons is obtained from all coal carbonised, and that these hydrocarbons, once obtained, are employed in the most effective manner.

The Hydrocarbon Enrichment Value, suggested by Pexton[11], is a most useful criterion in assessing the extent to which the gaseous hydrocarbons potentially available from the coal have in fact been obtained in practice. The extension of this method described by Lewis[15], by which the recorded Hydrocarbon Enrichment Value is expressed as an Equivalent Thermal Yield, is a valuable development of this idea, in that it permits a comparison of the total gas yield which would have been obtained if the hydrocarbons had been diluted with blue water gas and the actual gas yield which was obtained where the diluents may well have been producer gas or even waste furnace gases. Having regard to the importance of conserving the hydrocarbons available from the coal, the introduction of waste gases as diluents must always represent a poor use of gas-making coals, although the need to vary gas outputs in relation to demands may justify the use of producer gas as a diluent provided that at the same time other enriching media are not employed.

More Gaseous Hydrocarbons Needed

When all has been done to obtain from coal the maximum yield of hydrocarbons which the carbonising process can give, there still remains the need to find more gaseous hydrocarbons for enriching the blue water gas which may have been made in order to reduce the total demand for coal or in order to give flexibility in output in accordance with the principles discussed in the previous section, and it is now a well established practice of gas manufacture to use petroleum oils for supplementing the gaseous hydrocarbons obtainable from coal. Hitherto the oil used for this purpose in Europe has been gas oil, which can be cracked conveniently and efficiently in existing designs of carburetted water gas plant. But with the development of the diesel engine for transport by road, rail and sea, there has opened up a vast and lucrative market for oils of this quality. Prices have risen and are still rising, and in consequence there has been a strong incentive to look to the heavier petroleum fractions which have been used with success in the United States of America. These fractions, of course, contain a higher proportion of carbon and a lower proportion of hydrogen, and in the U.S.A. have been obtainable at such a price that the coke formed *in situ* by spraying these oils into the generator has been cheaper than coke made from coal—a situation most unlikely to arise in countries where the natural fuel resources are coal and not petroleum. Nevertheless, even in these countries there is a distinct attraction in striving for the use of the heavier fractions of petroleum as sources of hydrocarbon gases. In

(*Continued on p. 531*)

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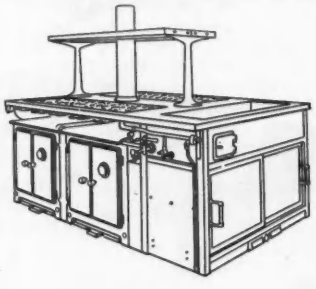

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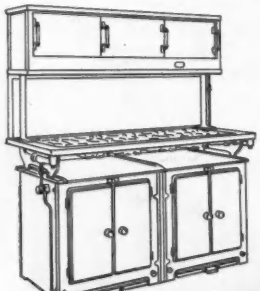

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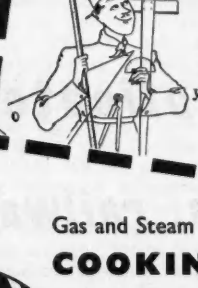

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earlier pages, reference has been made to the use of petroleum for peak load processes and the fact that the ease of handling and storing a liquid raw material is of predominant importance in this connection.

Gas oil is the easier material to use with its relatively high hydrogen/carbon ratio, and its ability to give a high yield per gallon with the minimum production of coke, but for the same reasons that have caused heavier oils to be employed for the carburetting of water gas, processes which can use these heavier and cheaper oils are likely to have an attraction.

Petroleum, in these two forms of gas oil and heavy oil, is likely to remain for many years an important raw material of the gas industry and there is now a third form in which petroleum is being considered as a source of hydrocarbon gases. Mention has been made of the possible use of liquefiable petroleum gases from petroleum refineries for meeting peak demands, and the limitation to their use in this manner imposed by the fact that it is unreasonable to pass peak demands from the gasworks on to the petroleum industry. There is, however, a hope that where a gas producing station is situated sufficiently close to a petroleum refinery, the refinery gases could be used as a regular base load source of gaseous hydrocarbons, such proportion of them as is deemed necessary being liquefied and stored under pressure for peak load requirements. In the development of such uses, it will be important to remember that while these gases could take the place of gas oil as a base load source of enriching hydrocarbons, they do not possess the merit of gas oil for meeting variations in demand through the medium of the carburetted water gas process. Gas oil can be stored cheaply and conveniently and rapidly converted to gas when required. The only terms for the supply of refinery gases likely to be attractive to the petroleum refiner would be such that the gases are taken and used as they are produced.

The Place of Petroleum

The place of petroleum as a raw material for town gas manufacture is an important one, even though the thermal value of oil used for gas manufacture represents little more than 2% of the thermal value of the coal and coke used for gas manufacture in Great Britain. (Gas from petroleum represents about 6% of the thermal value of all gas made.) The proportion used in the future may increase, although it is not possible to visualise that petroleum will ever take the place of coal as the main raw material for gas manufacture in those countries where coal is indigenous and petroleum must be imported. Furthermore, as Parker[16] has pointed out, the world reserves of oil are equal only to one-third of 1% of the coal resources. With oil shale included, the possible petroleum reserves barely reach 1% of the coal reserves and it is clear that the gas industry must look in other directions than petroleum for its future supplies of gaseous hydrocarbons.

Some gaseous hydrocarbons are obtainable from the fermentation of organic matter, either at sewage works or, if it were possible to gather it together, from agricultural waste—but the contributions would be small. A far more promising natural supplementary source is the methane gas released as coal seams are worked. The practicability of using this source has been shown by M. Brabant[1] and there have been widely varying estimates made for the coal seams in Great Britain. Roberts[17] estimates that the amount of methane lost to atmosphere in Great Britain is equal to the whole yield of gas from the combined gas and coking industries of that country, which would represent about 2½% of the thermal value of all the coal raised. Parker[16] estimates the amount available at about 1% of the coal raised. Which of these estimates is the more accurate and how far it is practicable to recover and distribute this methane remain for future experience to show, but it is clear that a very substantial contribution should be obtainable from this source.

When all has been done to seek alternative sources of new materials, it will still remain necessary for the gas industry to use its traditional raw material, coal, to greater advantage and it cannot be accepted as a permanent limitation that only about one-eighth of the thermal value of coal is obtained by the gasworks in the form of gaseous hydrocarbons. It would appear that the shortage of coal, and particularly the shortage of certain types of coal, may be countered for a time by calling petroleum to our aid, but that the final answer must be to rely upon coal, although processing that coal in new ways which will show higher efficiencies and impose a less close specification upon coal quality. This paper opened by drawing attention to changing social conditions which had imposed a new pattern of costs upon the gas industry, and given a new urgency to the study of certain features of the cost structure. It is wise to recognise that these same changes are imposing their influence upon the coal industry which supplies and must continue to supply the gas industry's raw material. If they enforce the adoption of new and more highly mechanised methods, which may even involve cutting mechanically the coal at the coal face into a fine material which can be transported to the surface hydraulically or pneumatically, and thereby produce an unaccustomed raw material, that is the type of raw material which the gas industry will have to treat, and the consideration of new processes suited to this new form of raw material is by no means a diversion from the pressing problems of today.

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THE PEBBLE HEATER

A RECENT issue of the *Chemical Trade Journal* refers to an interesting new method of heat transfer developed in the United States, but beginning to be used also in Europe—namely, the pebble heater.

In this process a moving bed of ceramic material (small porcelain balls or pebbles) is used as a heat carrier. The method has been used for superheating steam for the dehydrogenation of ethylbenzene to styrene. One particular unit was able to heat about 7 tons/hr. of steam to 1,250° C. The pebble heater has also been used in the manufacture of carbon bisulphide, and is being considered for other applications in the cracking industry and in gas manufacturing plants.

The heater consists in principle of two separate chambers. In the upper heating chamber ceramic pebbles are brought to a high temperature by direct heating. The accumulated heat is moved by the downward flowing pebbles to the lower chamber where the endothermic reaction occurs. The cooled pebbles with deposits of carbon are then raised to the heating chamber, the carbon is burned off, and the pebbles are recycled. This method overcomes the difficulty of all direct-fired stills—namely, that carbon or coke deposited on the tube walls of the heat exchangers greatly diminishes the rate of heat transfer. It is important to note that the designs so far developed are limited to a maximum pressure of about 10 lb./sq. in.

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TRADE NEWS

English Numbering Machines

ENGLISH NUMBERING MACHINES, LTD., have introduced an improved version of their small resetting counter. This new unit is a complete re-design and will eventually supersede the Series 425 which basically was a special purpose counter developed during the last war. It has long been realised that the old model did not have the performance rating necessary for modern industrial counter applications, and, although many improvements were introduced, limitations of case space were such that it was decided to go ahead with what is in effect a completely new model.

This new Series 426 four or five figure small resetting counter is available with both ratchet drive and universal drive; the former provides a count for each shaft oscillation of 45° to 50°, the latter a count for each complete revolution of the driving shaft, whether revolved in a topgoing or topcoming direction of rotation. Conversely, it can be employed as a ratchet-operated unit counting one for each oscillation through an angle of 130° to 180°. Performance rating of the new unit is (for this class of counter) high, as the ratchet design is conservatively rated as 1,000 counts per minute and for the universal 1,000 r.p.m. Great attention has been paid to the internal construction and the quality of the components. All working parts are of hardened steel and have a cadmium flashing. The static parts (tie-rods, spacers, washers, support plates) are of stainless steel. The figure design provides for a clarity of reading up to 9-10 ft. which is exceptional for a counter having comparatively small dimensions. The drive of the counters can be on the left or right side with either direction of rotation (in the ratchet form) and left or right hand for the universal drive. Reset is by one turn of the knurled knob. At a little later a lock and key reset will also be available and a detachable key of the Yale type will be utilised.

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Publications Received

From SPERRYN & CO., of Birmingham, we have received a copy of their loose-leaf 'Gas Appliance Manual,' which gives full details and other information in connection with their G.805 and G.807 flame failure equipment. As further developments take place and new data compiled new sheets will be printed and sent out to keep the manual 100% up to date. The back pages of the manual set out valuable data for gas engineers and others.

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THE POWER-GAS CORPORATION, LTD., Stockton-on-Tees, has published a new brochure describing its fuel-gas plant designed to provide a flexible gaseous fuel capable of effective and efficient application at a highly competitive cost compared with other types of heating medium. Plants of the type illustrated have been operating for many years in all parts of the world producing a fuel gas of uniform quality delivered at a regular pressure with a high standard of cleanliness suitable for many industrial heating and process purposes.

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BROOM & WADE, LTD.—The July-August issue of the Broomwade *News Bulletin* tells the 'success' story of Mr. H. S. Broom, M.I.MECH.E., founder, Chairman, and Joint Managing Director, who has lately attained his 77th birthday. Finishing his apprenticeship with Davey, Paxman & Co., Ltd., of Colchester, he met his original partner, Mr. Jethro Wade, and together they accepted a loan of £5,000 from Mr. J. C. Peache, then Works Director of Davey Paxman, and started the business which has long borne their names and has gained fame not only at home but in many remote parts of the world. Some idea of the overseas activities of the Company is given on other pages of the Bulletin illustrating its exhibits at the International Trade Fair at Toronto, and at the Brussels Fair.

* * *

After a large circulation, the 'Mechanical Seals' booklet of CRANE PACKING, LTD., has been revised and enlarged. Four new mechanical seals are introduced—the 'compact' types 6 and 7, and the 'monitor' types 8 and 9. The new 'compact' seals are designed for low-pressure applications and the 'monitor' seals are simple, inexpensive, and easily replaceable seals for mounting adjacent to bell and roller races or other bearings. In the centre of the booklet a treatise on 'Mechanical Seal Design' is again included, but it has been revised and brought up to date. There are two new and useful tables, one a table showing the applications for which the various types of seals are designed and another table showing the component materials in which they can be made up in order to suit particular services. Copies of the booklet can be obtained from Crane Packing, Ltd. (Seals Division), Slough, Bucks.

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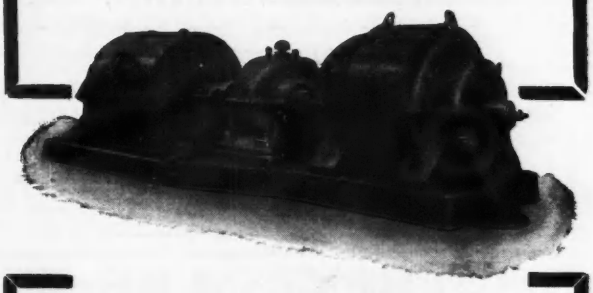

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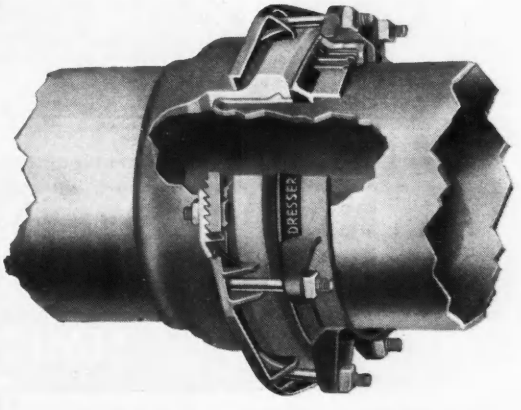

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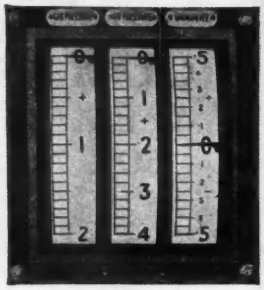

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SELWYN HOUSE, LONDON, W.C.1 TERminus 6526

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

SALES REPRESENTATIVE required for Southern Half England who has an established connection with maintenance side of gas industry. One already calling who could undertake extra representation would have excellent prospects. First class line. Apply : No. 117, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

SALES PROMOTION MANAGER

NATIONALLY known organisation in Domestic Appliance field intends to appoint a SALES PROMOTION MANAGER to its Head Office staff. Age limits 30-40 years.

Successful applicant will co-operate with Company's Advertising Agents, and must be experienced in the production side of advertising, literature, etc., and in Public Relations work. Permanent, pensionable position.

Reply in strictest confidence, stating salary required, to : No. 118, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

APPLICATIONS are invited for the position of SENIOR DRAUGHTSMAN with a Company in the Midlands specialising in the manufacture and erection of gas-works plant, oil storage tanks, and general jobbing foundry work. Applicants must be between 25 to 40 years of age, and corporate members of either the Institution of Civil, Structural, or Mechanical Engineers, or hold an Engineering Degree. Previous experience with Gas-Works Contractors is an advantage, and knowledge of foundry work is desirable. The position has good prospects of future advancement. Small modern house will be available shortly at reasonable rent. Commencing salary £750 per annum. Strict secrecy will be observed. Apply : No. 119, *Gas Journal* 11, Bolt Court, Fleet Street, London, E.C.4.

SCOTTISH GAS BOARD
KILMARNOCK GROUP
NEWMILNS DISTRICT

APPLICATIONS are invited for the position of DISTRICT MANAGER at the Newmilns District Gas Undertaking.

Applicants must be experienced in the operation and supervision of a Gas Undertaking and have sound practical experience in the control of horizontal retort settings, distribution practice and general office routine.

The salary applicable to the post will be within Grade VI Provincial "B" of the National Salary Scale (£460-£540 per annum) with free house, coal and gas. Placing on the salary scale will be according to qualifications and experience.

Applicants should state whether or not the position they presently hold is superannuated, and the successful candidate may require to undergo a medical examination.

Applications stating age, training, experience and qualifications, giving the names of two referees should be addressed to the undersigned within 14 days of the appearance of this advertisement.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
KILMARNOCK.
August 19, 1952.

(Classified advertisements continued on Supplement 4)

APPOINTMENTS VACANT (ctd.)

NEW ZEALAND GAS ASSOCIATION

CHEMISTS FOR
MOBILE TESTING SCHEME

APPLICATIONS are invited from GAS CHEMISTS for two positions in a new Mobile Testing Scheme which is to start operations early in 1953. Applicants should have a sound working knowledge of Continuous Vertical and Horizontal Retorts, Carburetted Water Gas Plant, and be conversant with routine gasworks testing.

The successful applicants will be required to visit various gasworks on a roster system; one chemist being away with the Mobile Laboratory, the other remaining in one of four fixed bases.

Commencing salary £600 per annum, accommodation expenses paid while away from base.

Successful applicants would be considered eligible for assisted passages under the New Zealand Government Immigration Scheme.

Applications, stating age, details of training, and appointments held should be made to the Secretary, New Zealand Gas Association (Inc.), c/o Wellington Gas Co., Ltd., Wellington, New Zealand, before November 30, 1952.

EAST MIDLANDS GAS BOARD

TECHNICAL ASSISTANT (PRODUCTION)—
SCUNTHORPE

APPLICATIONS are invited from suitably qualified persons, for the above post. The duties will include control of plant at the Scunthorpe Works and routine test work in the laboratory. The successful applicant may have to undertake duties from time to time at other works within the Scunthorpe Group.

The appointment will be made within grade A.P.T. VI of the National Scales, rising to a maximum of £555 per annum. The post is superannuable, and the successful candidate may be required to undergo a medical examination.

Applications giving full details of qualifications and past experience, and quoting the names of two referees, should be sent to Mr. S. H. Stokes, Group Manager, East Midlands Gas Board, Dawes Lane, Scunthorpe, to arrive not later than September 12, 1952.

BERNARD CLARKE,
Divisional General Manager.

Lincoln.
August 25, 1952.

EAST MIDLANDS GAS BOARD

NOTTS & DERBY DIVISION
ILKESTON UNDERTAKING
WORKS SUPERINTENDENT

APPLICATIONS are invited for the above position from suitably qualified persons, who should possess the Higher Grade Certificate in Gas Engineering (Manufacture) of the Institution of Gas Engineers or its equivalent.

Candidates should have had experience with Continuous Vertical Retorts and be capable of controlling general Works' plant and labour.

The commencing salary will be not less than £595 per annum, in accordance w th Grade A.P.T.IX.

The post is superannuable and the successful candidate may be required to pass a medical examination.

Applications, giving details of qualifications and experience, together with the names of two referees, should be addressed to the undersigned not later than September 13, 1952.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts & Derby Division,
Friar Gate,
Derby.

WEST MIDLANDS GAS BOARD

SENIOR AUDIT ASSISTANTS

APPLICATIONS are invited for the following positions:

(*a*) SENIOR AUDIT ASSISTANT, Warwickshire Division to be stationed at Coventry.
(*b*) SENIOR AUDIT ASSISTANT, Walsall and District Division to be stationed at Walsall.

The successful candidates will be responsible to the Board's Chief Accountant for the internal audit work of the Division.

Applicants should preferably be qualified accountants and should have had experience of the audit or the accounts of a public utility undertaking.

The salaries for these posts will be in accordance with Grade X (£645-£745 per annum) of the National Salary Scales for Gas Staffs.

The posts are superannuable, and the successful applicants may be required to pass a medical examination.

Applications, stating age, qualifications and experience and giving the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

SOUTH WESTERN GAS BOARD

CHELTENHAM SUB-DIVISION
WORKS FOREMAN—DURSLEY UNIT

APPLICATIONS are invited for the position of WORKS FOREMAN at the Dursley Unit.

Applicants should be good disciplinarians and have a sound mechanical knowledge of Gas Works machinery. Experience in control of Horizontal Retorts and C.W.G. plant is essential.

The successful applicant will be required to pass a medical examination and to reside in the Board's house on the Gas Works, which will be available at a reasonable rental.

The salary will be within Intermediate Grade VIB (£420-£465 per annum) of the National Joint Industrial Council's Scale for the Gas Industry.

Applications stating age, qualifications, training and experience, together with *copies* of two recent references, should be addressed to the undersigned to reach him not later than September 20, 1952.

A. L. MORRIS,
Manager.

Cheltenham Sub-Division,
South Western Gas Board,
North Street,
Cheltenham.

NORTH WESTERN GAS BOARD

OLDHAM-ROCHDALE GROUP
SENIOR SHOWROOM ASSISTANT—
OLDHAM UNDERTAKING

APPLICATIONS are invited for the position of SENIOR SHOWROOM ASSISTANT at the Gas Service Centre, Market Place, Oldham. The salary for this position will be within Grade A.P.T. V (£445-£525 per annum).

Candidates should have had experience and training in the control of showroom and staff, and in sales and service as applied to the Gas Industry.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Detailed applications, giving the names of two referees should reach the General Manager, North Western Gas Board, Oldham-Rochdale Group, Gas Offices, Dane Street, Rochdale, within fourteen days.

August 29, 1952.

NORTH WESTERN GAS BOARD

NORTH CHESHIRE GROUP
DISTRICT SERVICE MANAGER—
MACCLESFIELD AND BOLLINGTON DISTRICT

APPLICATIONS are invited for the above position at a salary of £850 per annum.

The person appointed will be responsible for all aspects of consumer service within the districts named, including the organisation of gas installation and maintenance staffs, the control of showrooms and general administrative co-ordination. Possession of the Institution of Gas Engineers Higher Grade Certificate in Gas Engineering (Supply) and Certificate in Gas Salesmanship and Consumer Service will be considered an advantage.

The successful applicant may be required to pass a medical examination and to subscribe to such superannuation scheme as the Board may adopt.

Applications appropriately endorsed, giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the Group General Manager, North Western Gas Board (North Cheshire Group), Great Portwood Street, Stockport, within fourteen days of the publication of this advertisement.

EASTERN GAS BOARD

TOTTENHAM DIVISION
MECHANICAL ENGINEER—
DIVISIONAL OFFICE

APPLICATIONS are invited for the above appointment from candidates between 27 and 45 years of age who are Corporate Members of the Institution of Mechanical Engineers or hold an equivalent qualification.

The responsibilities cover the eight gas works of the Division and the duties will mainly comprise:—

(*a*) Supervision of all mechanical requirements under the Factories Acts, *e.g.*, steam boilers and pressure vessels, gasholders, lifting appliances, etc.
(*b*) Safety precautions.
(*c*) Inspection of mechanical plant at makers' works and supervision of erection.

(The Works Engineers in each locality are responsible for mechanical maintenance).

The successful candidate will be required to pass a medical examination and to join such contributory superannuation scheme as the Board may adopt.

The appointment will be made within Grade A.P.T. XI Metropolitan (£700-£825) of the National Salary Scales for Gas Staffs.

Applications, stating age, qualifications and experience, should reach the Divisional Personnel Manager, Woodall House, 658, Lordship Lane, London, N.22, not later than September 13, 1952.

August 6, 1952.

PLANT FOR SALE & WANTED

FOR SALE:—Elbows ½ in. Gas, malleable—parallel thread. Large quantities available. Apply: Buying Department, The Parkinson Stove Co., Ltd., Stechford, Birmingham, 9.

WANTED:—REGULAR SCRAP GAS METER AND PARTS. Best prices paid. Offers to: Mitcham Smelters Ltd., Red House Road, Croydon, Surrey. *Tel.*: THOrnton Heath 6101 (Private Branch Exchange).

"Gas Service"

The only Journal covering fully all aspects of the sales and service side of the Gas Industry:—

★ WOMAN'S VIEWPOINT
★ INSTALLATIONS
★ DIARY AND PERSONAL
★ SPECIAL ARTICLES
★ EXHIBITION REVIEWS
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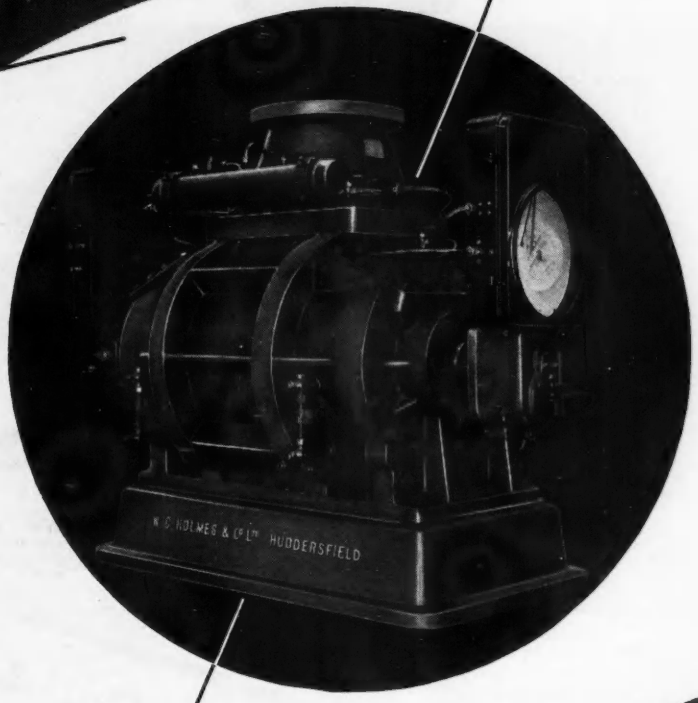
HOLMES-



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HIGH PRESSURE METERS

Are similar in principle to the standard type, but of extra heavy construction to withstand working pressures up to 75 lbs. per sq. in. These meters are fitted with instruments for pressure and temperature correction.

Positive Displacement ensures accurate measurement.

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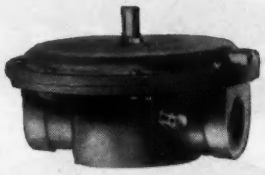
1613

Tornado

AUTOMATIC GAS CUT-OFF DEVICES



THE SINGLE DIAPHRAGM, AUTOMATIC SHUT-OFF VALVE *(illustrated left) automatically closes the gas supply in the event of pressure dropping below a predetermined point. Not until all burner cocks on the outlet have been shut and gas pressure restored is it possible to re-open the valve. This appliance is for operation on systems handling 150 to 2,400 cub. ft. of low pressure gas per hour.*

INJECTORS BURNER NOZZLES BLOWPIPES RADIANT DISC BURNERS LAUNDRY AND TAILOR IRONS SOLDERING IRONS SOLDERING STOVES SMALL FURNACES

"TORNADO" AIR AND GAS MIXTURE CONTROLLERS AUTOMATIC CUT-OFF SWITCH (ALSO USED AS METER PROTECTION VALVE

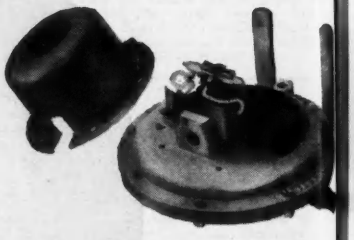
INDUSTRIAL GAS AND AIR FLOW SWITCH) AUTOMATIC SHUT-OFF VALVES NON-RETURN OR BACK PRESSURE VALVES METER PROTECTION VALVES (BY-PASS TYPE)

EQUIPMENT RELAY THERMOSTATS THERMOSTAT CONTROLLERS DIRECT ACTING THERMOSTATS SERVICE GOVERNORS AIR FLOW SWITCHES COMPRESSORS GAS FIRED UNIT HEATERS GAS BOOSTERS AIR BLOWERS

THE AUTOMATIC CUT-OFF SWITCH, *illustrated right, automatically breaks the electric supply to motor-driven gas boosters or compressors if low pressure gas falls below a predetermined pressure.*

RANGE: *Type 1 operates between .2" and 1.2" w.g. pressure.*
Type 2 operates between 1.2" and 5" w.g. pressure.
Type 3 operates between 5" and 15" w.g. pressure.

Additional applications include its use as (a) an air flow switch in conjunction with a flame failure device and (b) a gas meter protector.



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431/8/GJ

COAL AND COKE SCREENING & SIZING PLANTS.

RETORT SETTINGS PRODUCERS, FURNACES REPAIRS.

GOODALL, CLAYTON & Co. LTD.
LEEDS.

CONVEYORS, ELEVATORS, BUNKERS, ROOFS, HOISTS, Etc.

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BRITAIN'S BEST BELT FOOD

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METAL TO METAL JOINTING CEMENT

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PLASTIC METALLIC PACKING

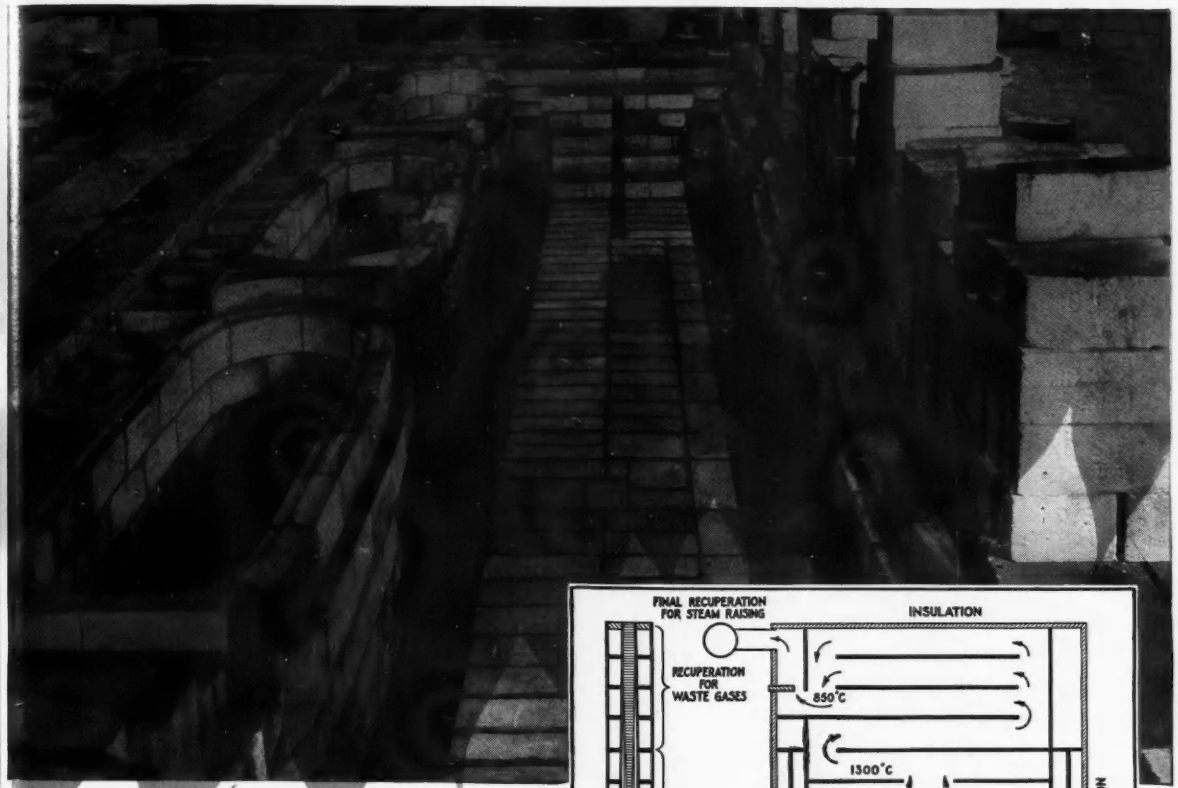
Sole Manufacturers: **GRANT & WEST, LTD.** 3, FURLONG ROAD LONDON, N.7

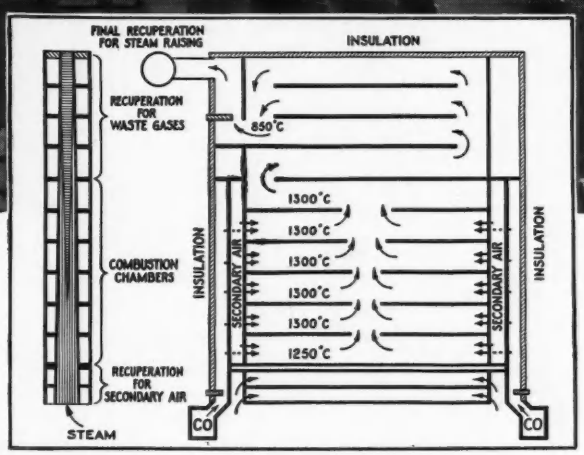
Selekjoina, Holway, London North 2160/2111

Printed by Straker Brothers Ltd., E.C.2, for Walter King, Limited, 11, Bolt Court, Fleet Street, London, E.C.4. Wednesday, September 3, 1952

"Balanced Heating"

MEANS ECONOMICAL GAS—MAKING





Great reductions in the amount of fuel required for the carbonization process have been recorded in the "Balanced Heated" settings of the Glover-West continuous vertical system.

This is due to two main factors. The retorts are heated by *primary* combustion of producer gas which enters the combustion chambers at *both* sides of the setting. Even heating of the retorts ensures maximum utilization of heat and eliminates high local temperatures and fuel wastage.

In addition, improved control of individual combustion chamber temperatures ensures maximum gas production from all coals.

* *Illustration shows a "Balanced Heated" setting under construction.*

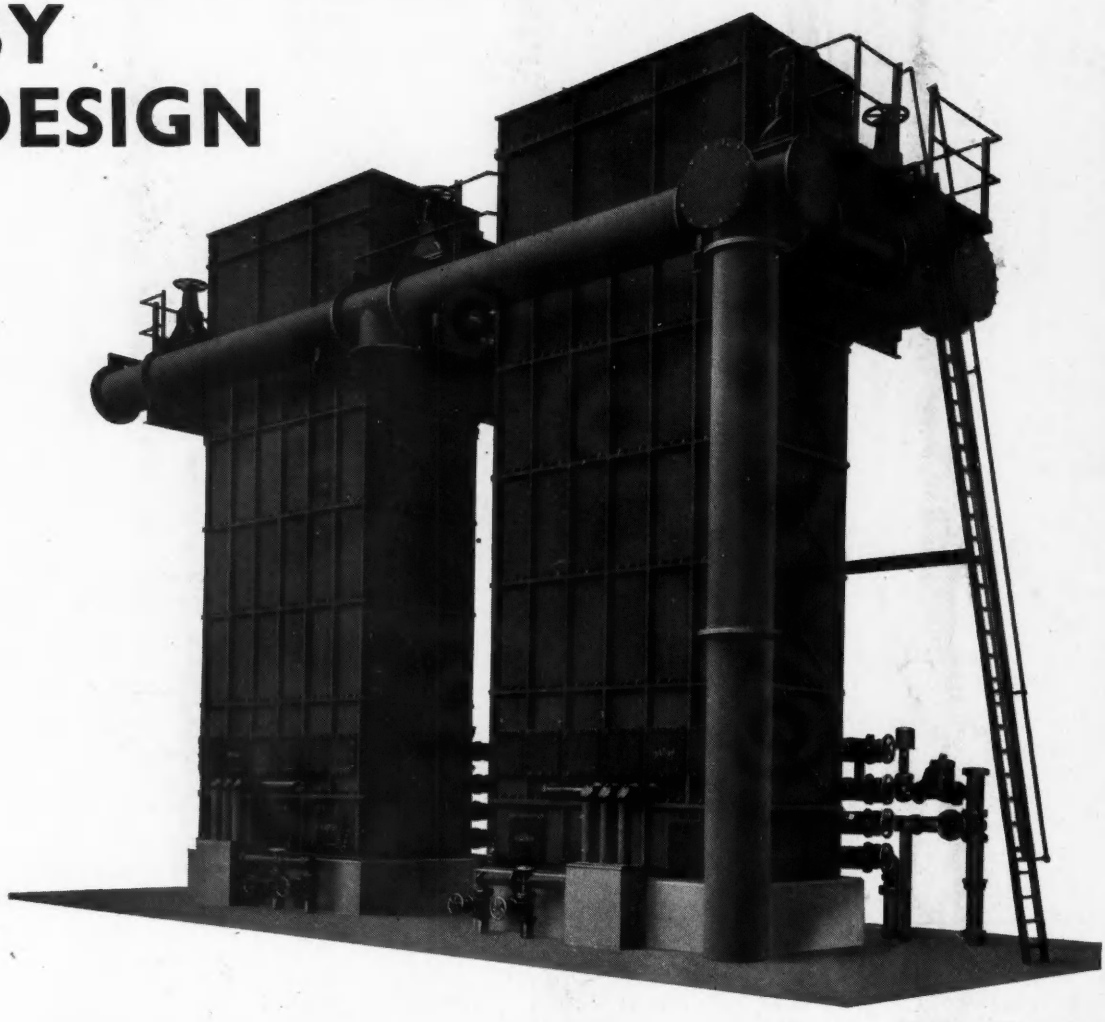
West's Gas IMPROVEMENT CO. LTD.

ALBION IRONWORKS · MILES PLATTING · MANCHESTER 10

Telephone: COLlyhurst 2961. Telegrams: Stoker, Manchester.

London Office: Columbia House, Aldwych, W.C.2. Phone: HOLborn 4108-9 Grams: Wesgasco, Estrand.

PERFORMANCE BY DESIGN



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